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HERE'S *ANOTHER* TYPICAL GAS/OIL
RATIO REDUCTION JOB ACCOMPLISHED WITH THE

BAKER
CEMENT
RETAINER

Report of Baker Cement Retainer

Company [redacted] Dickinson, Texas Well No. #5
Field [redacted] Lease [redacted]
Operation supervised by [redacted] - Gen. Supt.
Name of cementing company
Depth of well 8096 Ft.
Size of casing or liner 6-5/8" O.D. 26#
Depth of casing or liner 8062 ft.
Depth retainer set 7990 ft.
Tubing or drill pipe (state size) 2½" Ups. Tubing
Any difficulty in running in None
Depth to top of fluid 0 Ft. Approximate temperature
Pressure required to trip slips 1000# Pressure required to set retainer 1st - 8 lines - 10 points
Pickup required to set retainer elevators
Is tubing held in spider or elevators elevators
How was circulation joint used To back up Retainer and to circulate fluid out ahead of water and cement.
Quantity of cement used - 150 sacks
Initial pressure 1700# Final pressure 2100#
Was second ball used? State details:
How was cement discharged Through the Retainer
Did retainer function properly? State details: Yes
Was customer satisfied with Retainer? State fully: Yes
Can we pass information to others? Yes
CHARACTER OF JOB IN DETAIL: Cement Squeeze Job.

Before Squeeze: The casing had 3000# and the tubing 3000# pressure with a gas/oil ratio of 35,000-1. The well is now making 587 barrels of 39.3 gravity oil After Squeeze: The well is now making the gas/oil ratio is now 725-1. through ¼" choke:

The Squeeze Job: A Baker Cement Retainer was set as a Bridge Plug at 8041 ft. and then shot with 12 holes over a 6' area. A second Retainer was then set above perforations at 7990'. The formation broke down from 1800# to 1500# with 15 barrels of water. 150 saxs of cement were then run with the last of the cement pumped in with a final pressure of 2100#.

Reported by: W. H. Griffin

Date 2-21-38.

(*) Report will be held open until all information has been secured. Pertinent information can be added and repeated in drawing, such as depth of well, position of formations encountered, etc. Jobs of special interest and importance should be reported more fully, using this form as a guide.

Form 647-P SM 9-37

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2½" UPS TUBING
6⅝" O.D. 26#
7990'
8041'
8062'
8096'
BAKER CEMENT RETAINER
PERFORATIONS 12 HOLES
6'
51'
GAS SAND
BAKER BRIDGE PLUG
OIL SAND
BAKER SHOE OPEN HOLE
94'

SEE THE BAKER SECTION OF YOUR 1938 COMPOSITE CATALOG

BAKER CEMENT RETAINER

ESTABLISHED 1909
Vol. 31
No. 8
Whole
No. 1511
TWENTY CENTS
OIL WORLD MONTHLY
APRIL 20,
1938

RECORD TIME

with

H. C. SMITH DRILLING TOOL

One of the drilling crews on the A. T. Jergins Trust & The Superior Oil Company's Seaside No. 2 Well in the Long Beach Harbor area which established record drilling time. Left to right: Jack Rabineau, tool pusher; Millard Garrett, driller; Urel Armer; Harold Whitson; Red Carey, derrick man; and A. A. Parks. Superintendent Slim Law was in charge of field operations, aided by Lew Rogers, engineer.

Congratulations to A. T. Jergins Trust The Superior Oil Company and the cre who drilled the Seaside No. 2 Well in reco time with two H. C. Smith drilling bits—o H. C. Smith Drag Bit and one H. C. Sm Rock Bit made 2512 ft. of 15½ inch hole the record-breaking time of 41 hours, cluding one round trip. Bits were run 200 to 300 r.p.m.

We are justifiably proud that our equi ment played a part in the record drilli time made on this hole, again proving th YOU GET MAXIMUM PERFORMAN WITH H. C. SMITH DRILLING TOOLS.

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CALIFORNIA
OIL WORLD
and Petroleum Industry

THE AUTHORITY ON THE CALIFORNIA OIL INDUSTRY

APRIL 20, 1938
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The California Oil World's Series of Articles on the Beginning and Development of the Oil Companies Making Up the California Petroleum Industry Will Be Continued in an Early Issue.

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State Drilling Report

Field	Company	Well.	No.	Sec.	Twp.	Range
		NEW WELLS				
Wilmington	Republic Petroleum Co.	Republic-Harbor	1, 2 & 3	2	5S	13W
	Universal Cons. Oil Co.	Newport	3, 4 & 5	2	5S	13W
	General Petroleum Corp.	Blinn	3	35	4S	13W
	General Petroleum Corp.	Harbor Comm.	43	2	5S	13W
	Allied Petroleum Corp.	Allied	28	35	4S	13W
	Hollywood Oil Co.	Baxter	1	2	5S	13W
	The Hancock Oil Co.	Harbor	C-17	2	5S	13W
	Silver Gate Oil Co., Inc.		1	32	4S	13W
	Union Pacific Railroad Co.	U. P. 85, 86 & E-10		3	5S	13W
Montebello	Gus Pongratz	Drake Comm.	1	2	2S	12W
	Union Oil Co.	Fred Howard	1	2	2S	12W
	The St. Helens Pet. Co., Ltd.	Monterey	27	2	2S	12W
Long Beach	A. S. Johnston Drlg. Corp.		33	13	4S	13W
	The Texas Co.	Wilson Fee	1	29	4S	12W
Coyote Hills	Severns Drilling Co., Ltd.	Sierra	1	16	3S	9W
	The Hancock Oil Co.	Day	1	21	3S	9W
	Millerand Petroleum Co.	Miller	1	22	3S	9W
	Kelmar Oil Co.	Kelmar	1	16	3S	9W
Piru	Continental Oil Co.	Elkins	1	23	4N	19W
Sespe	Merchants Petroleum Co.		8	1	4N	20W
Torrance	Doyle Petroleum Corp.	Getty	3	14	4S	14W
	The Texas Co.	Wilson Comm.	9	15	4S	14W
	D & B Oil Co.	D & B Oil Co.	1	30	4S	13W
Rosecrans	Universal Cons. Oil Co.	Universal Trust	3	18	3S	13W
Santa Barbara Co.	Jonata Oil Co.	Ward	1	16	6N	31W
Santa Maria Valley	E. H. Moore, Inc.	Union Sugar	F-1	19	10N	34W
	Signal Oil & Gas Co.	Yelkin	2	26	10N	34W
	Union Oil Co.	Bradley Lands	3	25	10N	34W
	Ido J. Banducci	G & B	1	26	10N	34W
Sunset	Salling Drilling Co.		9	2	11N	24W
Midway	Berry & Ewing		2	31	32S	24E
Rio Bravo	The Superior Oil Co.	Anderson	1	35	28S	25E
	Union Oil Co.	Kernco	3-34	34	28S	25E
Poso Creek	Reynolds Oil Co.	Reynolds	1	30	27S	27E
Cat Canyon	The Petrol Corp.	Tognossini	21-A	9	8N	32W
Mt. Poso	W. P. W. Petroleum Co.	Packard	2	14	27S	28E
	Shell Oil Co.	Matthew Fee	6	4	27S	28E
	Seaboard Oil Co.	Glide	1	7	27S	28E
	Master Petroleum Corp.	Recovery	3	33	26S	28E
Kern Co.	Continental Oil Co.	K. C. L.	E-1	17	30S	26E
	Pan-May Oil Co.	Pan-May	1	31	27S	29E
Canal	The Ohio Oil Co.	KCL-E	6	14	30S	25E
Fruitvale	Western Gulf Oil Co.	34-KCL-B		14	29S	27E
Ten Section	Shell Oil Co.	KCL-B	21-32	32	30S	26E
Kern River	Spencer Petroleum Corp.		4	10	28S	27E
	Helm & Smith	Helm & Smith	3-A	34	28S	28E
Round Mountain	H. A. McDonald	Larkin	3	12	28S	28E
Coalinga	Section Thirty Oil Co.		5	30	19S	15E
Solano Co.	Richfield Oil Corp.	Potrero Hills	1	10	4N	1W
		DEEPEN OR REDRILL				
Long Beach	Western States Drlg. Co.	Orbit	1	29	4S	12W
	South Basin Oil Co.		27	24	4S	13W
Wilmington	Wilmington Oil & Dev. Co.		W-2	33	4S	13W
Torrance	The Superior Oil Co.	Torrance	6	14	4S	14W
	W. E. McCaslin		1	23	4S	14W
	Summit Oil Co.	Huyck	1	14	4S	14W
Richfield	Boswell Petroleum	Breen	2	28	3S	9W
Huntington Beach	Camroo Oil Co.	Smith	1	10	6S	11W
	Westport Oil Co.		5	2	6S	11W
Dominguez	Union Oil Co.	Callender	50	33	3S	13W
	Union Oil Co.	Carson	8	33	3S	13W
Rosecrans	St. Anthony Oil Corp.	Gordon	1	19	3S	13W
	H. B. Oil Co.	Stephens-Rosecrans	1	19	3S	13W
	Howard Oil Co., Inc.	Gordon	1	19	3S	13W
Devils Den	H. L. F. Oil Co.		1	25	25S	18E
Lost Hills	Security Oil Co.		4	24	26S	20E
Midway	Standard Oil Co.		18	19	31S	24E
	Honolulu Oil Corp.		36	14	32S	24E
Sunset	Anchor Oil Co.		4	2	11N	24W
	Lew Suverkrop		3	32	12N	23W
Coalinga	General Petroleum Corp.	Esperanza	23	6	20S	15E
Poso Creek	Pebble Beach Oil Co.	Roscoe-Stanley New Hope	6	29	27S	27E
Kern River	C. C. M. O. Co.	2, 8, 13, 15, 16, 38 & 39		23	28S	27E
		ABANDON				
Santa Fe Springs	Wilshire Oil Co., Inc.	Wilshire-Cecelia	1B, 2	6	3S	11W
Playa Del Rey	California Production Co.		1	21	2S	15W
San Bernardino Co.	Verne Chute	Lucerne Valley	1	14	4N	1W
	E. A. Tompkins Co.	Abacherli	1 & 2	12	3S	8W
Arroyo Grande	Dollie Adams	Tiber	9	6	32S	13E
	Dollie Adams	Tiber	55 & 65	31	31S	13E
	Dollie Adams	McNee	3-A	6	32S	13E
Mesa	D. A. Brown		1	28	4N	27W
Midway	Loscal Petroleum Co.		2	23	31S	22E
Belridge	Belridge Oil Co.		16-35	35	27S	20E
	Shell Oil Co.	Voight One	1	32	27S	20E
Mt. Poso	W. P. W. Petroleum Co.	Packard	1	14	27S	28E
	Ring Oil Co.	Loudon	2	32	26S	28E
Round Mountain	Shell Oil Co.	Olcese Five	1	22	28S	29E
	Calif. Western Oil Co., Ltd.	Kernco	1	13	28S	28E
El Segundo	Republic Petroleum Co.	Republic El Seg.	2	18	3N	14W
Ventura	Continental Oil Co.	Hobson	3	15	3N	24W
Lost Hills	The Texas Co.	Theta	2-23	2	26S	20E
	Tidewater Assoc. Oil Co.		1	11	26S	20E
Sunset	Ruby Oil Co.		1	2	11N	24W
Semitropic Gas	Standard Oil Co.	Randolph Comm.	2	14	27S	23E
Fruitvale	Shell Oil Co.	KCL-A	58-29	29	29S	27E
	Mohawk Petroleum Corp.	K. C. L. 23	2	23	29S	27E
Mountain View	Union Oil Co.	Kernco A	2, 3 & 4	15	30S	28E
Coalinga	Shell Oil Co.	Conlon	1	30	19S	15E

Summary	Week Ending April 16	Previous Week	To Date This Year	To Date Last Year
Total New Wells	30	25	358	419
Total Deepened or Redrilled	8	21	251	207
Total Abandoned	17	13	148	147

Last minute reports as we go to press inform us that the Superior Oil Co. has completed Wagner No. 2 at Rio Bravo flowing 1109 bbls. of 37.5 gravity clean oil from bottom of 11,449 ft. and that the same company brought in the Ruhl "No Dope" No. 1 flowing at an unknown rate.

At Montebello, St. Helens Pet. Co. successfully shut off the water in Monterey No. 24 and completed it flowing at the rate of 3000 bbls. per day oil and 3,000,000 cu. ft. gas. The well is producing from a hitherto undeveloped horizon.

California Crude Oil Production

For Two Weeks Ending April 9, 1938

Field	April Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Belridge—North	17,595	15,585	*2,010
Belridge—South	1,895	1,237	*658
Buena Vista	18,260	18,799	539
Canal	1,225	1,552	327
Coalinga—East-West	16,670	12,299	*4,371
Coffee Canyon	3,675	4,196	521
Edison	3,020	3,701	681
Elk Hills	8,595	11,259	2,664
Fruitvale	7,615	9,124	1,509
Greeley	4,190	3,096	*1,094
Kern Front	9,485	9,964	479
Kern River	5,300	2,864	*2,436
Kettleman No. Dome	80,075	81,108	1,033
Lost Hills	4,665	3,775	*890
McKittrick	3,615	3,597	*18
Midway	47,860	38,802	*9,058
Mount Poso	16,760	19,493	2,733
Mountain View	10,510	12,431	1,921
Rio Bravo	1,240	1,812	572
Round Mountain	11,350	13,710	2,360
Ten Section	6,255	5,813	*442
Other Fields	2,505	2,902	397
TOTAL	282,360	277,119	*5,241
Coastal Counties			
Elwood	6,045	6,967	922
Rincon	2,800	3,524	724
Santa Maria	8,835	4,500	*4,335
Santa Maria Valley	10,000	9,588	*412
Santa Paula-Newhall	5,360	5,328	*32
Ventura Avenue	35,960	38,753	2,793
Other Fields	6,455	7,260	805
TOTAL	75,455	75,920	465
Los Angeles Basin			
Alamitos-Seal Beach	8,885	9,350	465
Brea-Olinda	8,920	6,008	*2,912
Coyote—East	3,020	3,503	483
Coyote—West	9,125	8,833	*292
Dominguez	25,165	26,292	1,127
El Segundo	11,250	14,395	3,145
Huntington Beach—New	15,235	19,636	4,401
Huntington Beach—Old	14,450	15,642	1,192
Inglewood	15,900	15,847	*53
Long Beach	49,620	58,225	8,605
Montebello-Extension	8,095	8,145	50
Playa del Rey	6,620	7,033	413
Richfield	8,750	9,639	889
Rosecrans-Athens	3,490	6,183	2,693
Santa Fe Springs	33,620	37,012	3,392
Torrance	7,285	6,453	*832
Wilmington	64,105	100,863	36,758
Other Fields	2,430	2,630	200
TOTAL	295,965	355,689	59,724
STATE TOTAL	653,780	708,728	54,948

*—Shortage.

Little Sespe Cable Tool Operations Reward Improved Completions Methods

By Louis C. Chappuis

Mr. Chappuis, well known consulting geologist, will present from time to time in these pages thumb nail sketches of areas in California which offer opportunities to independent operators.

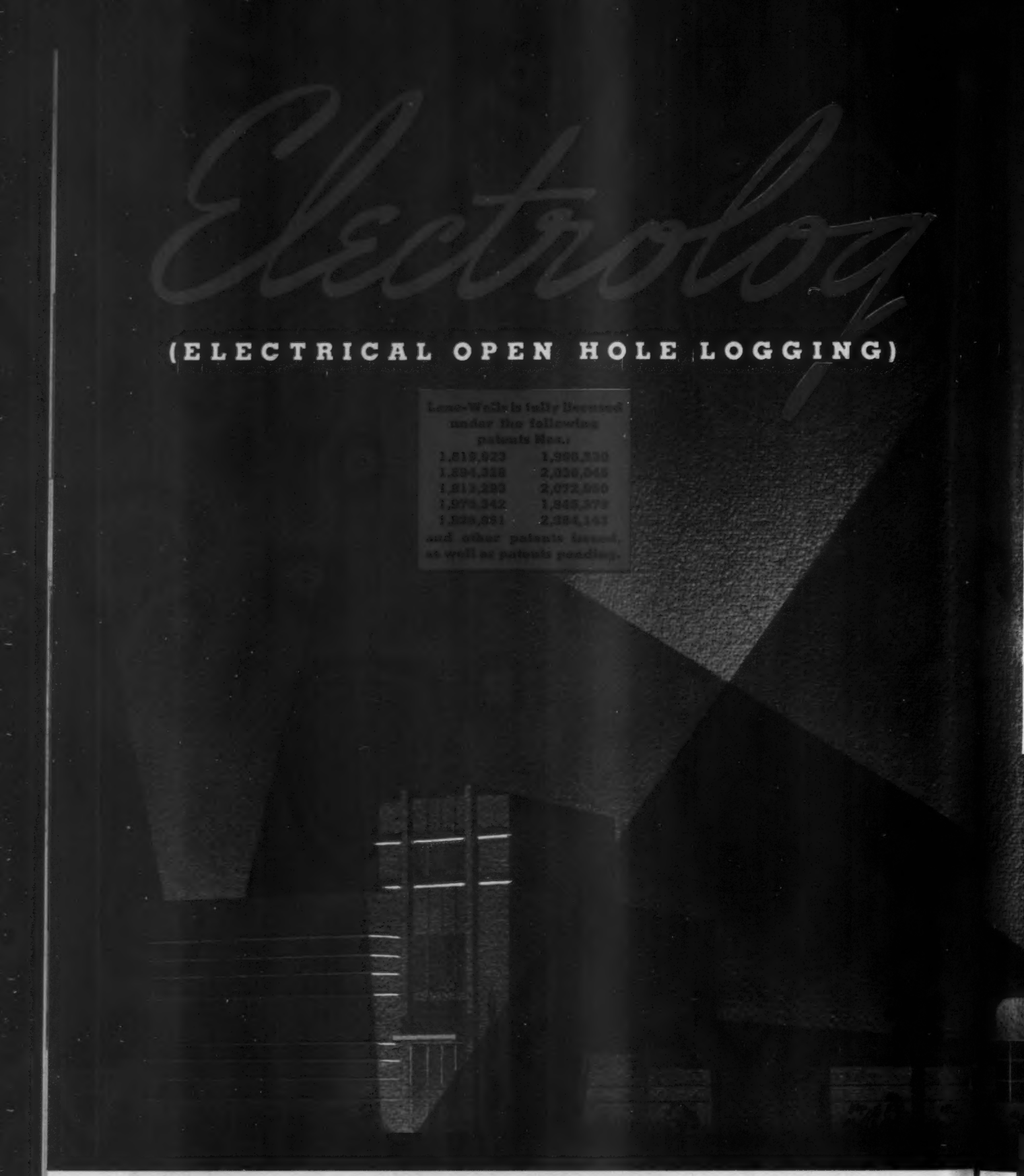
Before discussing the area from where the Merchants Petroleum Co. and D. Ivers properties are producing in the Little Sespe field, I wish to make reference to several other leases located within the limits of the Topatopa anticline in the Tar Creek area.

The Fillmore Oil Co. located in section 33 T. 5 N. R. 19W. began drilling in the year 1907. Up to 1926 seventeen wells ranging in depth from 1100 to 3600 feet were completed as commercial producers. Quite a number of these wells had initial productions as high as 300 bbls. per day with gravities ranging from 30 to 35 degrees A.P.I. All of these wells penetrated the full thickness of the Vaqueros formation and were bottomed on the upper member of the Sespe. None of these wells were carried deep enough to have penetrated the middle and lower Sespe horizons which in this particular region are very prolific and should with future development constitute an additional reserve for the state. This fact was well demonstrated by the drilling of the Colima Oil Co. well in section 29 which well was carried down to 3400 feet. On a production test before setting of the oil string this well flowed by heads at the rate of 500 barrels per day of 23 gravity oil. After setting the oil string and cementing the same through perforations, the producing sands were cemented off inadvertently. This well is now standing idle, but the company is awaiting good weather and improved road conditions to start a new well. The production obtained by the Fillmore Oil Co. from seven wells in the year 1925 was 1000 bbls. per month. At present the property is only producing 300 bbls. per month. This decline is attributed to the fact that in the year 1917 a severe brush fire destroyed practically every rig on the property with the consequent result that many of the wells were junked. None of these wells were ever properly completed. The setting of liners and the cementing of water strings were practices unknown to the operator. This property has recently changed hands and the new operator is planning a reconditioning program of the old wells and the drilling of new ones. With the dry season approaching a renewal of activities will be started by several operators who have recently acquired leases in this area.

In 1929 the Merchants Petroleum Co. acquired the old holdings of the Big Sespe Oil Co. located in section 1 T. 4 N. R. 20 W. Prior to this acquisition the Big Sespe Oil Co. had drilled 4 wells on this lease. These wells were drilled to 1200 feet and were completed as small producers. The production from three of these wells at the time of Merchants acquisition was only 300 bbls. per month. In 1930 the Merchants Petroleum completed their first well from a depth of 1330 feet. The initial production of this first completion was 550 bbls. per day of 23 gravity oil clean. This well is now producing 75 bbls. per day. The second well drilled by Merchants; namely No. 6, was completed from a depth of 952 feet in 1933. The well after flowing soda water at the rate of 2000 bbls. per day for several days bridged itself up, stopped making soda water and commenced flowing by heads at the rate of 600 bbls. per day with a cut of 17%. The present production is 50 bbls. of oil and 150 bbls. of water. No attempt has been made by the operator to exclude this water. The third well drilled by the company was a redrill job; one of the old wells that had been drilled to 1200 feet. This well was taken down to 2297 feet. The well was completed in 1935 with an initial production of 230 bbls. of 21.5 gravity clean oil. Its present production is 35 bbls. per day. Well No. 7, a new well, was redrilled and completed in 1937 from a depth of only 980 feet. Its initial production was 450 bbls. of 16 gravity oil. It is now producing 250 bbls. per day. This well is located at the end of a tramway 800 feet long. The cost of this well complete including the tramway was about $19,500. Barring unforseen mechanical troubles this and other companies can drill and complete wells in this general area at a cost not to exceed $20 per foot. This lease is located on the east steep plunge of the Coldwater anticline, which anticline at this point is overturned. The broad flank being to the north.

Another interesting producing property in this area is the H. D. Ivers lease located immediately south from the Merchants Petroleum Co. This property was originally developed by the Union Oil Co. in 1894. After this company operated the property for a period of 20

Taken from the tramway, this photo shows the central jack plant from which all the Merchants Pet. Co. wells are pumped.



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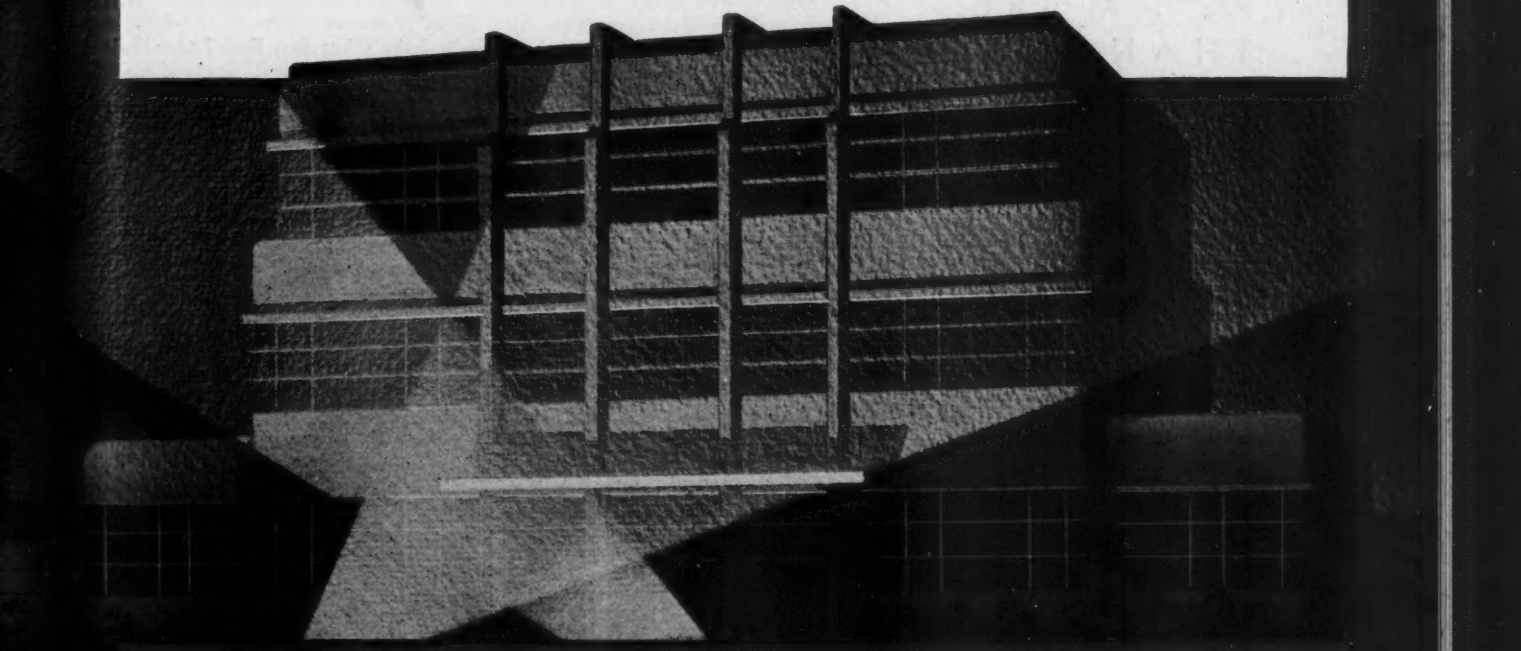

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CALIFORNIA—Bakersfield, Long Beach, Santa Barbara • KANSAS—Hutchinson • WYOMING—Casper

LAUGH THIS OFF

The oil business is just like a sausage machine. You get out of it exactly what you put into it—but you'd never recognize it.

Which recalls **Joe Scanlon's** old yarn about the oil man who hied himself to the local haberdashery to purchase a lid. "Would you care for a Homburg?" asked the beaming clerk, and you can imagine his embarrassment when said oil man replied, "Naw, I ain't hungry. I want a hat."

And it is difficult to believe, but **Spud Tyler** swears for a fact that in some of the mid-western states, the people live in such dilapidated shacks they have to go outside and sit in their limousines when it rains.

Also, since the revival of the depression, and the renewed interest in economical operation, **Pat Tracey** advises that supper dishes left over till morning can be cleaned with a good grade of coarse sandpaper.

Now comes **Charlie Gross** with an exciting story from his home land. It seems that one of Charlie's English buddies landed a job as a newspaper reporter, and on his first trip turned in the following scoop, "A shocking affair occurred last night. Sir Ultimate Penurious, a guest at Lady Flatfoot's ball, complained of feeling ill, took a highball, his hat, his coat, his departure, no notice of his friends, a taxi, a pistol from his pocket, and finally his life. Nice chap. Regrets and all that."

Then there was the Santa Fe driller who forgot to put on his safety shoes, and had to go to see a chiropodist about a dog.

And to silence a persistent and malicious rumor, we wish to make it known definitely and emphatically that we don't live in Hollywood. We just haven't had time to get our pants pressed, that's all.

Mac McLaughlin was chatting with an old pipeliner down Dominguez way a few days ago, and for some unknown reason began discussing the events of the civil war. "Do you remember the sinking of the Maine? Mac asked him. "Sure, I do," was the answer, "and I was there when they laid the Signal Hill line ,too."

A Brea pumper was recently cured of a long standing case of deafness, when a golf ball struck him on the head. He was no doubt also cured of the habit of hanging around golf courses.

By the way, **Frank Bescos,** brother of Julie of U.S.C. fame, made a hole in one at the Hacienda Club a week ago Saturday. It was a 219 yard sock. Frank is quite modest about the whole business, and admits that he tried the same thing on all the remaining holes, but never repeated.

Ike Burroughs now tells us that a large stock of chewing tobacco was recently threatened by fire, but, unfortunately, the fire was extinguished before any real good was done.

And **Jack Ramsey** will never understand, in view of their experience, why the Chinese can't iron things out.

Yielding to the plea of a distressed friend the other day, **Bert Lowe** loaned him five—the first real touch of spring.

Experts tell us that suction keeps airplanes up in the air, and **Harry Lee** points out that horses are also supported by suckers.

John Howell, on the other hand, is of the opinion that the best way to prevent fire is to do your work properly.

And **Bob Patterson** says the reason some people never know when they are well off is that they never are.

A few of the lads were talking over their golf exploits on the preceding Saturday, and one exuberant individual enquired, "And what do you think my score was?" "Double," promptly responded **Frick Gibbs.** "What do you mean—double?" asked the enthusiast, and Frick quietly explained, "Well, double what you're going to tell us."

That concludes an elevating dissertation. Remember, in conclusion, that a bouillon cube is not necessarily a square meal.

And your home is no crematorium, so don't scatter your ashes all over the place.

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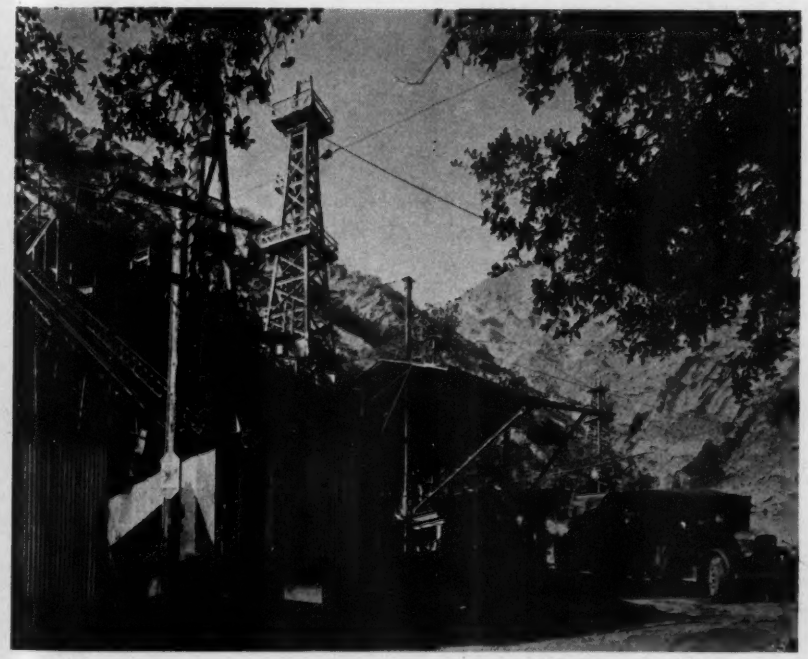
years the lease reverted back to the original landowner who is now operating the property, and continues to drill new wells with success. The decline on these wells is rather rapid, completions of from 50 to 100 barrels are common. New wells are drilled to compensate their rapid decline and to maintain balanced production. There are at present seven producing wells on this property with an allowable of 80 bbls. per day. The average depth of these wells is 1800 feet. The production from these wells contrary to the theories of geology is coming from a well defined syncline.

In the operations of the Merchants Petroleum Lease as well as those of the Ivers and other leases in this area not more than two strings of pipe have been used. A water string of 12½" or 10" casing and perforated oil string of 8⅝".

On the extreme east end of the Coldwater anticline in section 6 T. 4 N. R. 30 W., the Condor Oil Co. drilled a well in 1937. This well was carried down to a total depth of 2195 feet, and was finished with 5" casing and a very small liner. The poor mechanical condition of this well has prevented the operator from placing same on steady production. Whenever it has been possible for the operator to keep the well on the pump the daily production is 50 bbls. of 30 gravity oil clean. This oil is coming from the Vaqueros formation. Adjoining this property the Union Oil Co. up to the year 1924 was pumping several old wells on what is known as the Central and Los Angeles mineral claims. These wells were drilled in 1891 and ranged in depth from 700 to 1200 feet. Completion on these wells averaged between 75 and 100 bbls. per day of 21 gravity oil. These properties are held for future reserves, inasmuch as the lands are owned in fee. In the past, several operators have tried in vain to take over these leases with the thought of reconditioning the old wells and to drill new ones. Like the above referred to properties there are many other leases in this area that have in the past produced commercial quantities of petroleum, that are now standing idle and awaiting rejuvenation. Cable tool drilling is not entirely a lost art in California. The past and present development in the Sespe oil district and other districts of Ventura county proves conclusively that cable tools still constitute the only method to be used in certain oil bearing regions in the state. Several factors of importance should not be overlooked in drilling and developing prospective oil lands in regions where producing zones are found at comparatively shallow depths with consequent low gas pressures. These facts are brought out in data obtained from the successful development by the Merchants Petroleum Co. of the Coldwater anticline. There have been failures and sem-failures on adjoining leases when wells were drilled with rotary tools, and these failures can be attributed solely to the fact that the rotary method was used in preference to cable tools.



Built entirely of salvaged mine equipment, Merchants' 800-foot tramway was erected at a cost of only $600.

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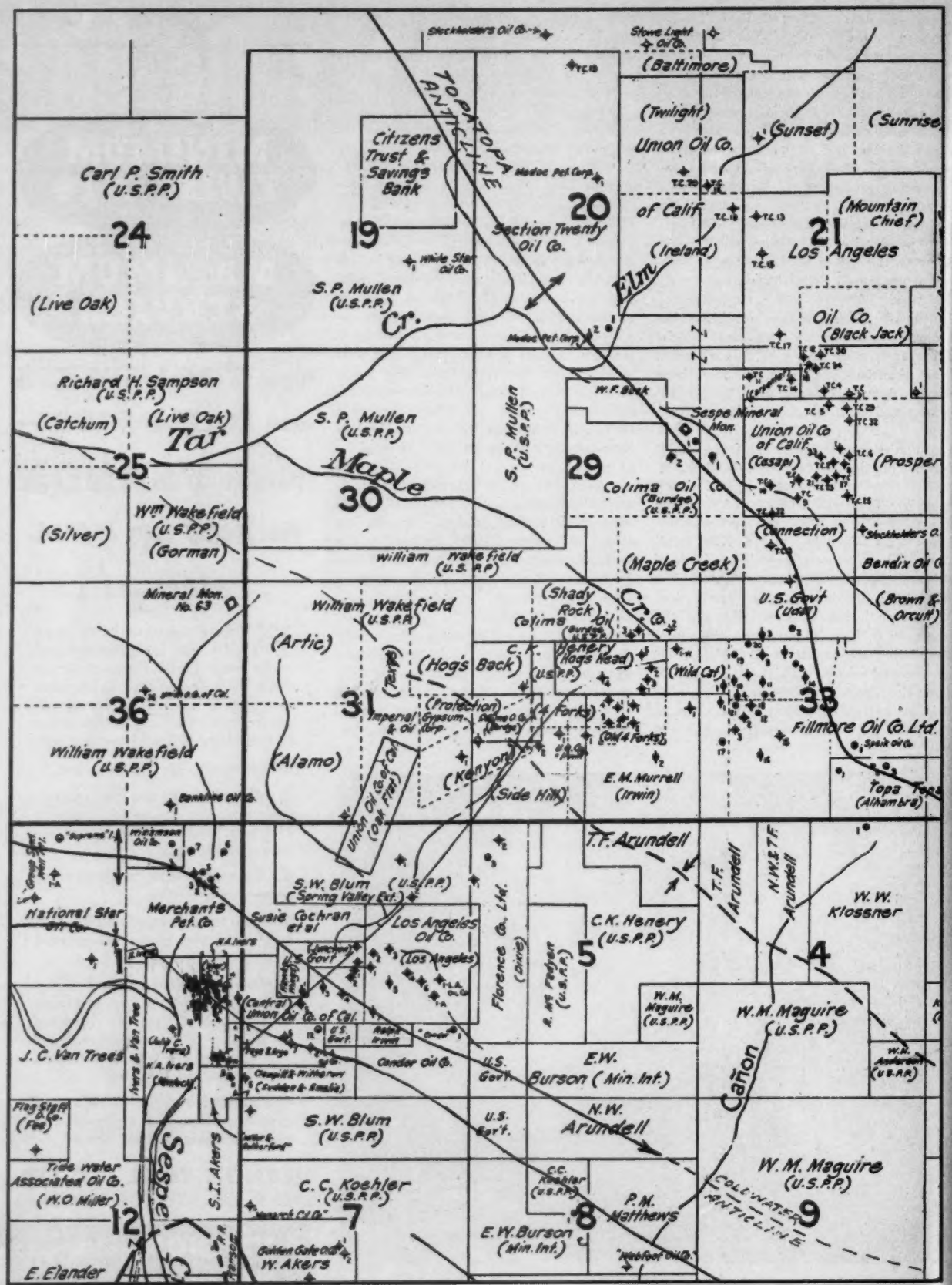

Map showing portions of Townships 4 and 5 north and 19 and 20 west discussed by Mr. Chappuis. Note the Ivers property in section 1 produces from a syncline while the Merchants property, half a mile north is located on the Coldwater Anticline.

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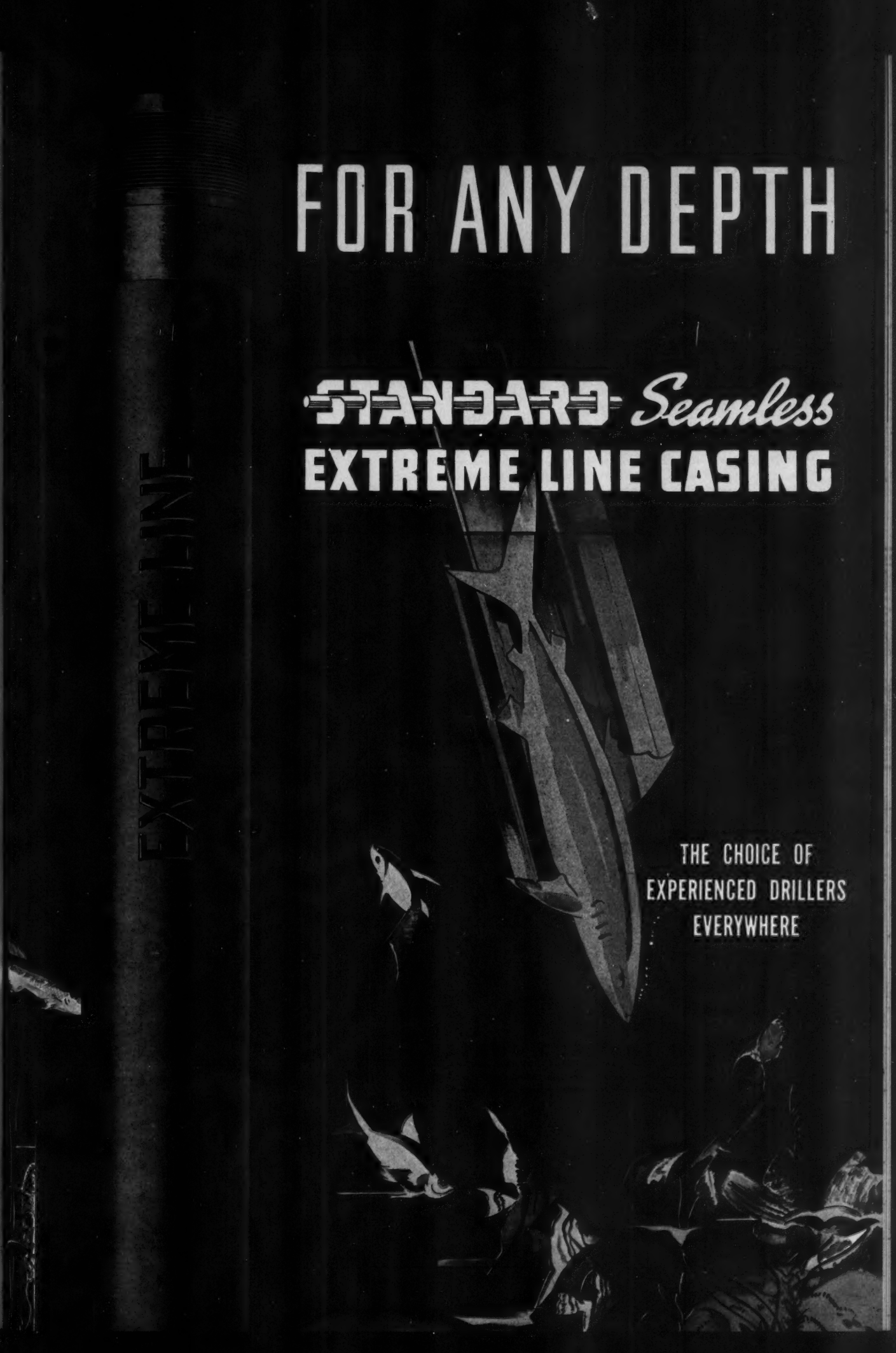


THE CHOICE OF
EXPERIENCED DRILLERS
EVERYWHERE

Record Of Continental's Deep Discovery

By Geological Division, Continental Oil Company

Continental Oil Co. well No. K.C.L. A-2 is located in an area of closure on a geophysical (seismograph) structural trend extending northwesterly from Greeley and Rio Bravo oil fields. It is located 660 feet north of well No. K.C.L. A-1 which was bottomed at 9,591 feet for mechanical reasons after having found some evidence of oil below 9,540 feet. This is the approximate stratigraphic position of the Stevens-Greeley oil zone in upper Miocene which is productive at Ten Section, Canal and Greeley oil fields.

Well No. K.C.L. A-2 was originally intended as a test of sands expected in the vicinity of 9,500 feet. Shale was found where sands were expected but the shale yielded considerable evidence of oil. Therefore deepening proceeded for the purpose of prospecting lower horizons. Summarized geologic data of the well are given below:

Electric logs indicate low permeabilities which confirm the low permeability determinations from sand samples. The best evidence of oil in the well has occurred in McLure shales and in Kreyenhagen shales, both having non-reservoir characteristics in this well and believed to be regionally the generator rocks for much of the oil in the San Joaquin Valley. Lack of oil in adjacent sands indicates that oil has not migrated from the generator rocks vertically; this may be attributed to the low sand permeabilities. A suggestion has been made that the sands attained these low permeabilities because of included cementing material before the time that oil might have migrated from the shales.

Substantial production of oil was demonstrated on April 11th from top of Rio Bravo Sand at 13,100+ feet opened through perforations from 13,092 feet to 13,175 feet where evidence of oil occurred during drilling and where electrical logs showed good "porosity" and "resistance" characteristics. This is the lithologic but not necessarily the stratigraphic equivalent of the Rio Bravo Sand which is productive in the Rio Bravo oil field 14 miles southeasterly from this well. This oil is believed to have originated from within middle Temblor (middle Miocene) rather than from upper Miocene or Oligocene oil bearing shales.

Temperature of 268 degrees is reported at depth of 14,200 feet. Survey to depth of 11,500 feet shows that the hole has migrated 21 feet horizontally from the surface location and this is the maximum drift to that depth; angles of inclination very from 0 degrees to ¾ degrees. From 11,500 feet to bottom of the well there has been no inclination over 2½ degrees. Apparent dips in cores have varied from 0 degrees to 5 degrees.

Depth From	Depth To	Lithology	Stratigraphy	Remarks
0′	8,440±′	Sand, silt and blue gray shale	Pleistocene and Pliocene	Oil in silty sand 7,119′ to 7,143′
8,440±′	9,527′	Grayish brown shale	Upper Miocene (Reef Ridge and McLure)	
9,527′	9,620′	Hard platy brown shale, chert streaks	Upper Miocene (McLure)	Oil and gas in cores and on ditch
9,620′	11,500±′	Hard brown shale, some chert streaks	Upper Miocene (McLure, Valvulineria and Gould shale)	Oil and gas in cores and on ditch
11,500±′	11,581′	Hard dark brown shale	Middle Miocene (Upper Temblor)	
11,581′	12,715′	Hard fine to medium sand, streaks of siltstone and hard dark shale	Middle Miocene (Upper Temblor) (Olcese Sand)	Low permeability fair porosity. Oil sand 12,599′ to 12,610′
12,715′	13,100±′	Hard dark shale, streaks sand and sandy shale	Middle Miocene (Upper Temblor?)	
13,100′	13,580±′	Hard fine to medium sand, streaks siltstone and hard dark gray shale	Middle Miocene (Middle Temblor) (Rio Bravo Sand)	Low permeability, fair porosity except upper 35′ where good permeability, porosity and oil saturation were indicated
13,580±′	13,800±′	Hard dark gray shale streaks hard sand and siltstone	Middle Miocene (Middle or Lower Temblor)	
13,800+′	14,000±′	Hard fine sand and siltstone	Middle or Lower Miocene (Lower Temblor or Vaqueros)	Low permeability, low porosity
14,000±′	14,162′	Hard dark in part fossiliferous shale	Oligocene (Tumey shale—Leda zone)	Oil in cores and oil and gas on ditch below 14,100′
14,162′	14,900±′	Hard dark shale	Oligocene (Upper Kreyenhagen —Uvigerina cocoaensis)	Oil and gas on ditch
14,900±′	14,967±′	Hard dark shale	Eocene? (Lower Kreyenhagen?)	Oil and gas on ditch
14,967′	15,004′	Hard fine to medium sand, streaks siltstone (Bentonite-indurated)	Eocene? (Domengine-Avenal Sand?)	Low permeability, low porosity. Oil showing at top

NOTE:—Random oil showings have occurred at depths other than noted.

How Deepest Well Went On Production

Continental Oil Co. is now resting on its laurels. The former record bested by more than 2200 ft. with a depth of 15,004 ft., the company proceeded to make KCL No. A-2 the world's deepest producer. Having already set 7-in. casing at 11,570 ft. (another record), it was only necessary to land a liner and swab the well "in". This was done by running 2898 ft. of 4½-in. casing to 14,315 ft. and cementing it above the perforated intervals which were from 13,092 to 13,175 ft. and from 14,049 to 14,315 ft. This permitted a program of drilling out and testing by stages, the last to be an open hole test from the shoe of the liner to bottom. In testing the first stage, the well was cleaned out through the upper perforated interval and tubing was run to 9696 ft. The fluid was swabbed to 2000 ft. at which point it showed a tendency to rise. Letting nature take its course, swabbing was ceased, and within six hours the fluid had reached the surface and the world's deepest hole was an oil well in every sense of the word. The first gauge showed 861 bbls. of 34.7 gravity oil cutting 2% water and 5.2% mud in only 12 hours through an orifice ⅜ of an inch in diameter. Opened up to a ¾-in. bean, the flow increased to a 3000 bbl. daily rate. The last available full 24 hour gauge was 1131 bbls. using a ¼-in. flow bean with pressures 1050 lbs. on the tubing and 735 lbs. on the casing.

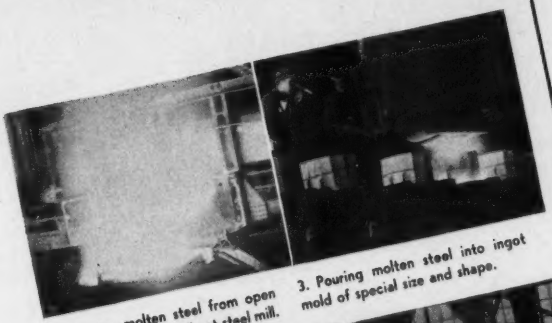
1. Charging pig iron and steel scrap in open hearth furnaces at steel mill.

TRACING the LIFE LINE

of AXELSON SUCKER RODS FROM PIG IRON TO FINISHED PRODUCT

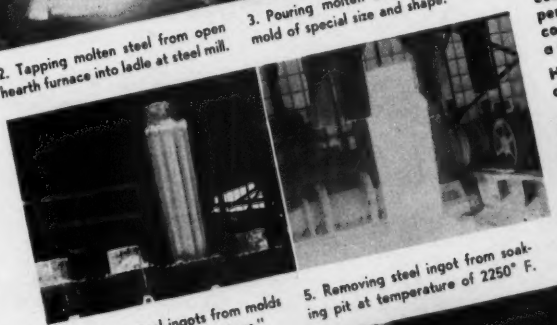
Nothing is ordinary in the manufacture of Axelson Sucker Rods. From the very beginning at the steel mill, everything is special. Smaller open hearth furnaces and smaller ingot molds of special shape are used. Longer time is required—more passes through the rolls—heavier cropping of ingots, blooms, billets and bars—are specified. Chemical composition, including nine or more elements, is regulated to the hundredth of one percent. Progressive tests and analyses are made and recorded, and if any test is not completely satisfactory, Axelson exercises the right to reject the entire heat—perhaps a hundred tons of good steel, but steel that is not good enough for Axelson.

Here are a few of many reasons why Axelson Sucker Rods reduce "down" time and cut "up" expense in the wells of the oil world.



2. Tapping molten steel from open hearth furnace into ladle at steel mill.

3. Pouring molten steel into ingot mold of special size and shape.

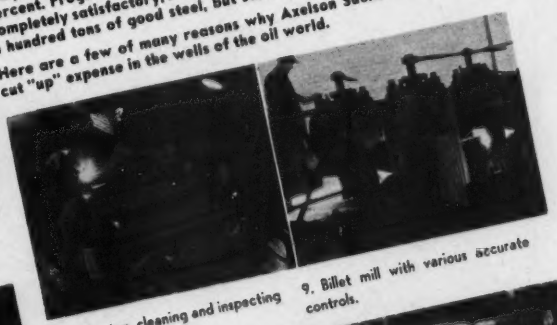


4. Stripping steel ingots from molds provided with special "hot tops."

5. Removing steel ingot from soaking pit at temperature of 2250° F.

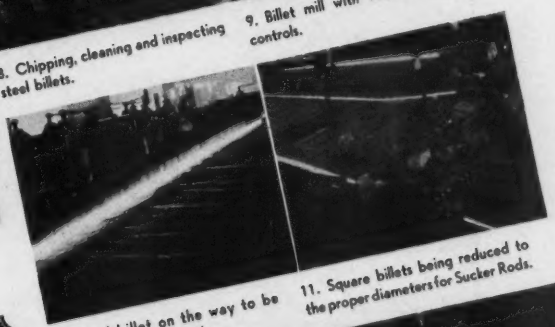
6. First pass of steel ingot through blooming mill rolls.

7. Stamping identification of heat numbers on steel bloom.



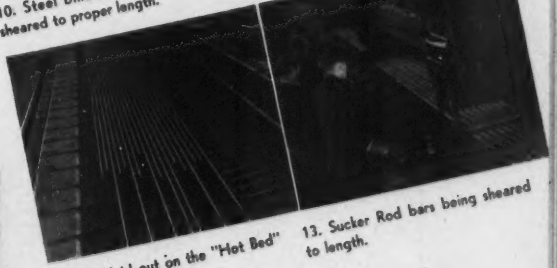
8. Chipping, cleaning and inspecting steel billets.

9. Billet mill with various accurate controls.



10. Steel billet on the way to be sheared to proper length.

11. Square billets being reduced to the proper diameters for Sucker Rods.



12. Bars laid out on the "Hot Bed" to cool.

13. Sucker Rod bars being sheared to length.

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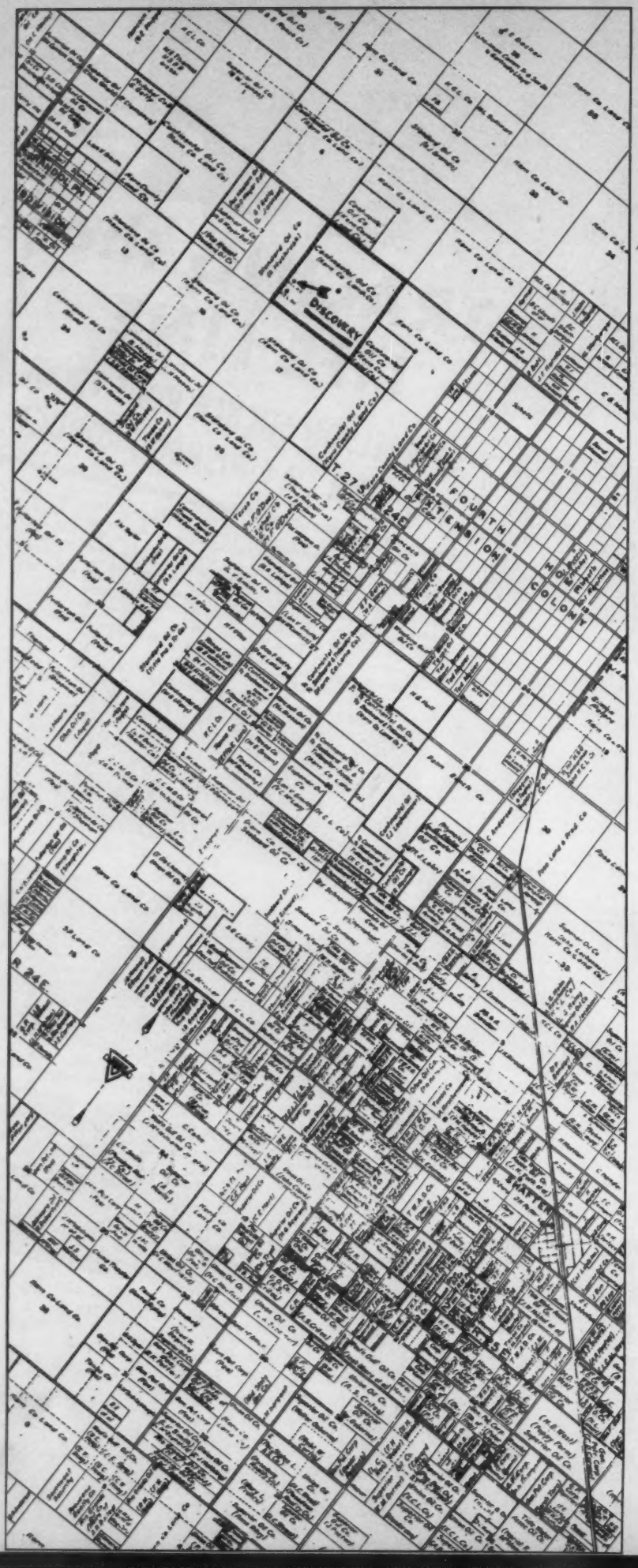


Gravity, meanwhile has risen to 39.5 degrees while the total cut has dropped to only 0.7%. Though steady production has not been possible due to lack of oil storage, both oil and gas rates are gradually increasing, the latter having risen from less than 200,000 cu. ft. to 315,000 cu. ft. When shut in, the tubing pressure builds up to 1400 lbs., but the casing pressure rises to only 755 lbs., possibly due to the presence of heavy fluid behind the tubing.

The two lower horizons in all probability will not be tested as long as commercial production is obtained from the "upper" zone which itself is 1800 ft. deeper than any other producing well.

The property map shown at the left is turned at a 45° angle to permit inclusion of the 14-mile interval between the Continental Oil Co.'s discovery well near Wasco and the deep Rio Bravo Sand field below Shafter. The Conoco compass indicator points north.

ON PAGE 40 OF THIS ISSUE

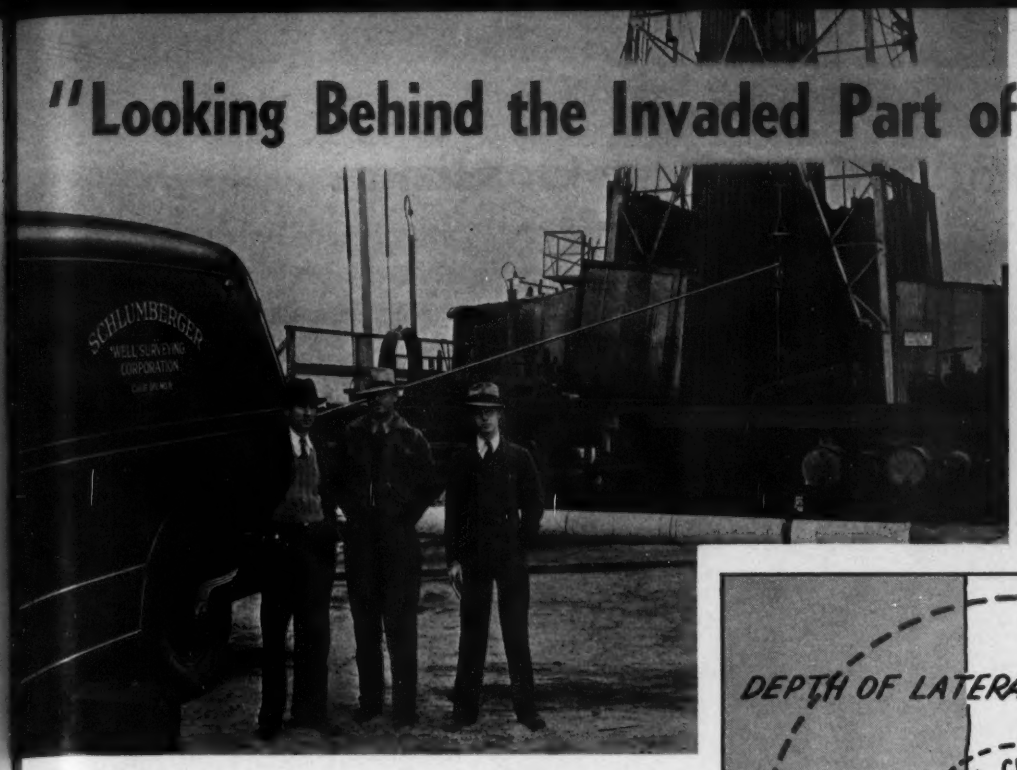
appears a diagrammatic representation of the generalized log of Continental Oil Company's record depth discovery oil well. The uppermost producing formation is found 1800 ft. below the previous deepest commercial pay.

"Looking Behind the Invaded Part of the Sands"

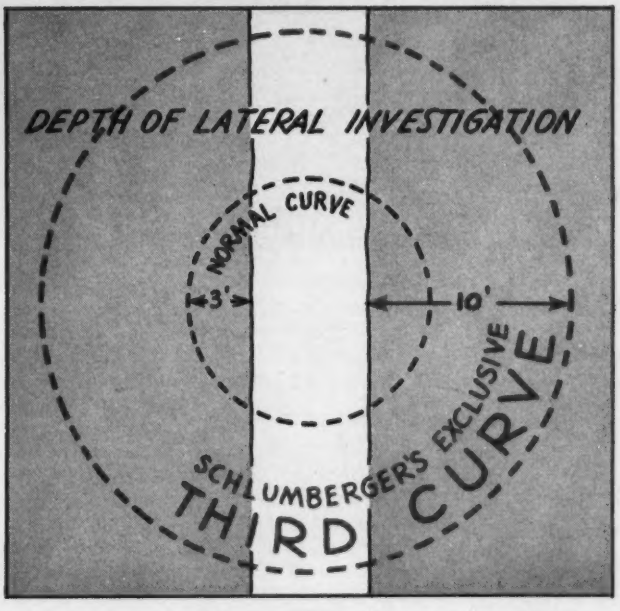
in the WORLD'S

DEEPEST WELL

Continental Oil Company's KCL A-2, WASCO, CALIFORNIA



Schlumberger service truck at the Continental Oil Company's record-smashing KCL A-2 Well, after taking an electrical log to bottom of the hole, 15,004 feet below the surface. Engineers in charge of the work are, left to right, J. H. Gallois, Schlumberger Well Surveying Corp.; C. H. Montgomery, Continental Oil Co.; R. L. Morris, Schlumberger Well Surveying Corp.



An excerpt from the Munger Oilogram of April 13, 1938. "A very interesting phase of Continental Oil Company's K.C.L. A-2 well is cited in the fact that, while passing through the present producing horizon, core recovery was poor. However, the industry's greatest aid today, the electrical logging device, revealed the possibilities of the zone that the cores missed and to Schlumberger must be given a large measure of credit for the successful completion of the World's Deepest Producer." Here is a new example of the accurate interpretation made possible by the Third Curve, an exclusive feature of Schlumberger logs.

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An exclusive Schumberger development, the Third Curve is an indispensable complement of the Normal Curve because it has a depth of lateral investigation of more than ten feet from the wall of the hole back into the formation. The Normal Curve, or Resistivity Curve 1, is essential for detailed and easy correlations, but it has a small depth of investigation, hence it is affected by drilling mud which sometimes invades the sands.

The greatly extended field of lateral investigation presented by the Schlumberger Third Curve, in combination with the basic information supplied by the Normal and Self-Potential Curves, enables the operator to "look behind the invaded part of the sands" so that the true characteristics of the formations can be accurately determined.

The knowledge made available by the Schlumberger Third Curve is as vitally important to operators whose wells are comparatively shallow as it is to those who are carrying their holes to record-breaking depths. Depending on their permeability, sands at any depth may be obscured by invasion by the drilling fluid.

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Eocene Production Near Coalinga

By Gerard Henny, Consulting Geologist

Since the first discovery of oil in the Coalinga District, some 40 years ago, this district has known times of prosperity and also some great disappointments. After the first boom years following the discovery of oil near Coalinga, the district lay almost dormant in the late twenties when the large companies made a gentleman's agreement to shut down their wells. The increased production of oil in the newly discovered oil fields of the Los Angeles Basin, made this move on the part of the major oil companies quite necessary.

However, new excitement was in store for Coalinga when the Milham Exploration Co.'s first well blew in on the Kettleman Hills in 1928. The new field was then advertised as the world's greatest oil field. After the first year of enthusiasm the new oil field proved to be somewhat of a disappointment. It is true that some large wells were brought in on the North Dome of the Kettleman Hills, but considerable water trouble was encountered on the Middle Dome, and the South Dome did not produce any oil at all. Soon it was predicted that the life of the North Dome Oil Field would not last very long.

At the present time, the Coalinga district has again attracted the attention of the oil men. Kettleman North Dome Association, Superior Oil Co. and Standard Oil Co. recently found production in the Avenal sand of the Eocene at a depth below 10,000 ft. in the North Dome of the Kettleman Hills. This discovery will not only renew activities in the Kettleman Hills, but it will be shown in the next article that the Shell Oil Co. as well as the Petroleum Securities Co. have already started in the quest of Eocene production in other parts of the Coalinga district.

A French author once said: to understand all literature, it is sufficient that one studies thoroughly one single book. The Coalinga district is so interesting for the geologist and oil man, that it can be said of this district: if one studies thoroughly the Coalinga District, one may get a complete understanding of all the oil fields of the world.

Before discussing in more detail the geology of the Coalinga district it may be well to consider this district first as a part of the San Joaquin Valley Basin.

The reader should imagine the San Joaquin Valley Basin,—as well as the Los Angeles, Ventura and Santa Maria basins,—as being vast troughs constituted of Pre-Tertiary rocks. Further it should be noted that, during the deposition of these Tertiary formations, the basins in their entirety have moved up and down. However, these were not the only movements during this deposition: the edges of the basins moved also, more or less independently from each other. These movements naturally caused the sea in the basins to grow wider and also to shrink at different periods. While the center of the basins was pretty well submerged during the entire Tertiary period, —although we know that this was not always the case,—the borders of the basins were laid dry at frequent intervals and became then subject to erosion. That is why, at the present time, more unconformities and overlaps exist near the edges of the basins than in their centers. Naturally the formations increase in thickness as one approaches the center.

In the past, in order to find new oil fields, geologists were looking chiefly for anticlines. This attitude has changed in more recent times. Many of the recent discoveries were made in localities where no anticlines exist. In order to make the reader acquainted with several of the conditions under which oil can accumulate in commercial quantities (especially in the Coalinga district), the writer has designed for this article a hypothetic cross-section. To understand fully this cross-section, the reader should note the following points:

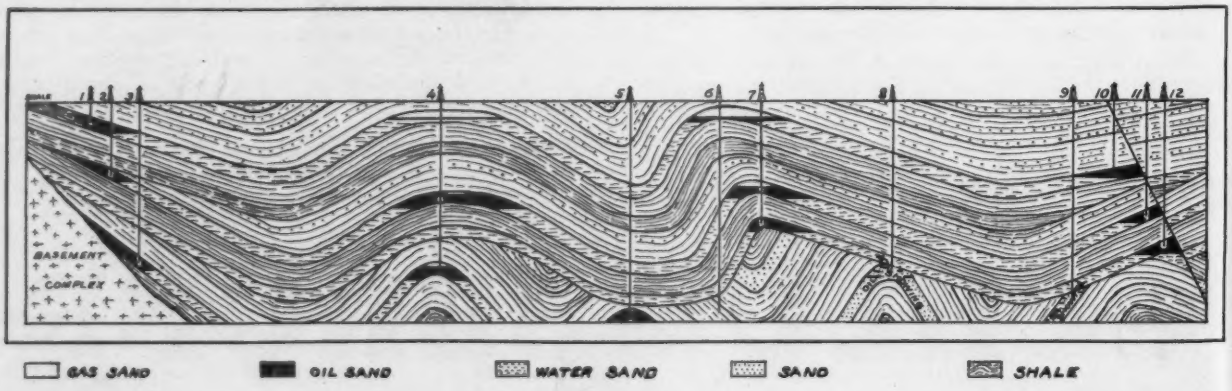
1. Oil is found mostly in sand strata or horizons. In some cases it is found in broken shales or limestones, but such occurrences are an exception in California.

2. Strata containing oil, contain nearly always also water and gas. On account of this circumstance, the oil and gas being lighter than water, they will migrate to the highest places in the folds. This means that oil and gas will be found on the top of anticlines or they may migrate upward in a monocline, where the oil and gas will escape at the surface of the ground unless held back for some reason. Sometimes a horizon will contain only water and gas, sometimes the water is lacking, and in this case the oil will be found down in syncline.

The reader will notice on the cross-section several supposed oil wells, numbered from 1 to 12, and the writer will now endeavor to explain which of these wells should be producers and why. He will also try to explain the different oil traps and the types of oil fields which are represented in this cross-section:

Well No. 1. The oil produced in this well comes from a monoclinal structure. It is trapped by a lateral change in formation, a change in facies; the sands, containing the oil, change higher up in the monocline into a shale impervious to oil and gas. This shale prevents the oil from reaching the surface.

Well No. 2. This well can produce from the same horizon as No. 1 but it has encountered a lower oil sand in which the oil has accumulated against an overlap. Such an accumulation of oil occurs



in the Coalinga oil fields, as well as in the Edison and Sunset-Midway oil fields.

Well No. 3 is outside of the production area on which wells Nos. 1 and 2 are located. It pentrates the "edge water" of those fields, but obtains production from a lower sand, where the oil is trapped against the "Basement Complex", by an "off-lap". The new Santa Maria Valley oil field is an oil field of this type.

Well No. 4 is drilled on the top of a symmetric anticline. It pentrates an upper gas sand where no oil is present and obtains production from two under-lying oil sands, with a water sand in between. Among oil fields of this type is the Kettleman Hills oil field. The anticline on which this oil field is situated is however not as symetric as the anticline on the cross-section.

Well No. 5 is situated on a syncline. An uncomformable lower formation happens to present an anticline at this particular location. Some of the newly discovered deep oil fields in the San Joaquin Valley may be more or less of this particular variety of type.

Well No. 6 is located on the top of an asymmetric anticline. This well encountered shallow gas and some oil. Lower, it encountered only water sands in the steep flank of the anticline.

Well No. 7 is on the flat flank of the same anticline on which well No. 6 is located. This well however finds production in two lower sands. Note that the lowest oil sand is of the same horizon as the water sand penetrated by well No. 4. The oil here is derived from a lower oil stratum with which it is in direct contact. The Semitropic anticline is an anticline of the type pentrated by wells No. 6 and 7.

Well No. 8 finds only oil showings in the deeper horizon, although reaching the top of an anticline. As was said before, the oil in this anticline has escaped in an upper sand, furnishing the oil for well No. 7.

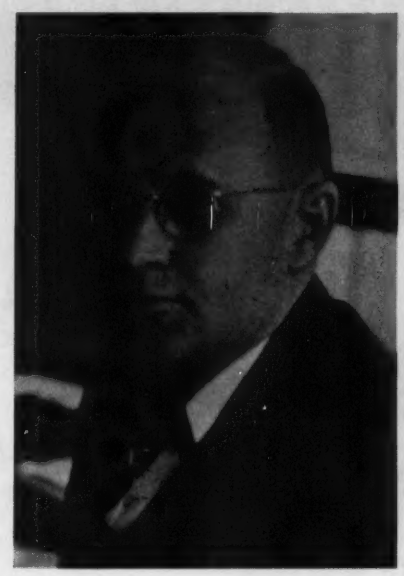
Well No. 9 is a dry hole. Although it reached an original oil sand below an unconformity, the oil escaped from here in an upper sand . If the overlying beds had been shale beds instead of a sandstone formation, the oil would have not escaped.

Wells No. 10, No. 11 and No. 12 encounter oil trapped against a fault. Fields of this type are the Mount Poso, Round Mountain, and Mountain View oil fields.

In the next article the writer will describe more in detail the Coalinga District and disscuss the possibility of finding more Eocene production in this region.

State and local trade associations in California are listed in a recent release by the U. S. Bureau of Foreign and Domestic Commerce. There are more than 5550 trade associations in the State of California.

Promotions In The Texas Company



James T. Wood, Jr.

Effective Apr. 1, 1938, James T. Wood, Jr., was appointed assistant manager of the producing department, The Texas Co. (California), with headquarters at Los Angeles.

Mr. Wood entered service of The Texas Co. on Mar. 16, 1929, as division geologist, Bakersfield, Calif. He was appointed assistant chief geologist on June 1, 1930, with headquarters at Los Angeles, and on July 1, 1931, was advanced to the position of chief of the lands and leases division of the producing department, Los Angeles, which position he held at the time of his appointment as assistant manager of the producing department.

Mr. Wood is a native of the State of Montana, having been born at White Sulphur Springs, is married and has one son. He is a graduate of Stanford University.

George R. Couper

Coincident with the promotion of Mr. Wood, George R. Couper was appointed chief of the lands and leases division of the producing department.

Mr. Couper entered service of The Texas Co. on June 1, 1919, as a clerk in the pipe line department at Houston, Texas. He was transferred to California on uly 1, 1929, as office manager of the lands and leases division, and on Aug. 20, 1937, was appointed general assistant in that division.

Mr. Couper is a Texan by birth, having been born at Houston, Texas, on Sept. 1, 1899, and is married.

New Group Testing In Section 23, 3-16

Palmluck Oil Co., recently organized by Palmer & Luse of Los Angeles, is preparing to start work on an interesting test well to be located in the center of sec. 23, 3-16, near Newhall. Although officials expect that commercial production may be found above 2,000 ft., heavy steam equipment will be used capable of carrying the test below 5000 ft. if necessary. No newcomers to the business, Palmer & Luse have in the past operated in various sections of the state.

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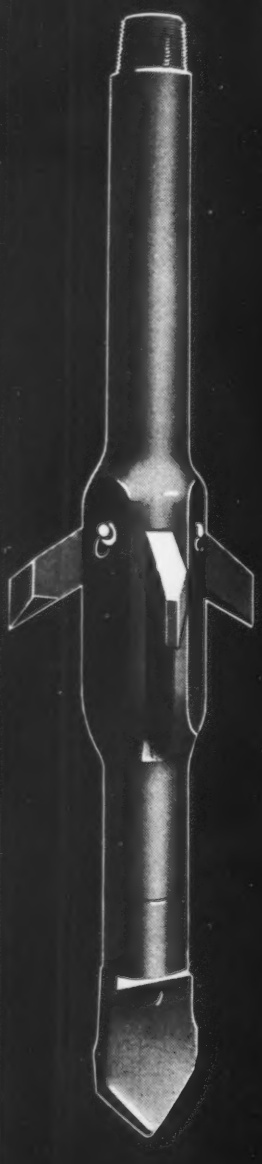

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George L. Tyler

George L. Tyler, new C.N.G.A. secretary, entered the natural gasoline industry in 1921 as stenographer for Wallace & Brooks, Inc. (W. J. Wallace of Wallace Refineries, Los Angeles). Then to Los Angeles in 1922 for Wallace Refineries and Pacific Gasoline Co. as clerk, statistician and later in contract department. In 1926 Mr. Tyler joined Standard Gasoline Co. In 1929-30 he was in the land department of Shell Oil Co. He was federal receiver of Nelson Petroleum Co., Ltd., and Knickerbocker Oil Co. in 1931-32. In 1935 he became contract agent for Del Rey Oil & Gas Co.

Pres. J. C. Burks, O. C. Field Gasoline Corp. V-Pres. H. R. Linhoff, Richfield Oil Corp. Sec.-Treas. George L. Tyler, 510 W. 6th, L. A.

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April, 1938

This section, a regular monthly feature of the California Oil World, is devoted to the activities of the California Natural Gasoline Association. The California Oil World is the exclusive official publication of the California Natural Gasoline Association, so designated by vote of the Association Executive Committee in a meeting on August 19th, 1937.

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Getting The Most Out Of Piston Rings

By Robert S. Ridgway
Mechanical Engineer, Standard Oil Co. of California

It is easy to get poor results from a set of piston rings. Operators are often puzzled about stuck and broken rings, worn grooves and scored liners. Fortunately, it is usually just as easy to get good results with the proper understanding of the function of the ring, its design features, the proper ring to use and the best place to use it, the fit, the side clearance in the groove, the proper end clearance and correct lubrication. If this is true, then a review of some of these factors which control the success or failure of piston ring operation should be in order.

We would like to limit this discussion to power cylinders only on relatively slow speed engines of not over three or four hundred R.P.M. We will also limit it to the Otto cycle engine, for in compression ignition engines with their attendant high pressures there are factors which require different treatment from the methods which are satisfactory in the low pressure engines.

We would also like to make it clear that this discussion is presented from the standpoint of the user of piston rings, and not from the manufacturing or design angle. We will look at the problem of how rings already offered for use should be selected and placed in service rather than how the manufacturer should make them.

Piston rings have these functions to fulfill: Primarily they must seal the combustion chamber pressure. They must assist in transferring the heat of the combustion chamber through the piston to the cylinder walls. They must do their share in the control of lubrication, and they must do all of this with a minimum of wall friction.

In adapting the rings to the piston and making it possible for them to fulfill their functions which we have enumerated above, the primary factors which in our opinion must be considered are: First, the number of rings to be used; second, the condition of the sealing surfaces; third, the ability of the rings to conform to the shape of the cylinder walls; and fourth, the freedom of the rings to function as they should under operating conditions. These items are not intended to indicate any order of importance, for each one is interrelated with the other, and piston rings will not function to their best advantage unless the proper consideration is given to each one of these factors. For example, a great deal of care can be used in cutting the lower face of the ring grooves and making sure that the ring is carefully ground, so that an effective seal between the ring and the land can be made. This care can all be nullified by not giving sufficient side clearance between the ring and the groove, or by giving the ring insufficient end clearance, or failing to watch out for some of the other requirements that are necessary to insure the power operations of the piston ring.

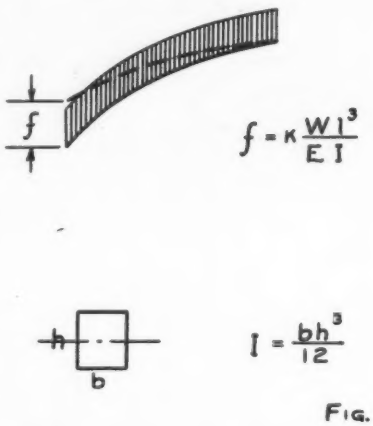

FIG. 1

The number of rings to use on a piston is greatly influenced by other factors, the principal ones being the type of the ring and its width. It has been developed that the total differential pressure between the combustion chamber and the crankcase is broken down into smaller differential pressures across each ring, each of which is some function of the total pressure and the number of rings. If, then, we use more rings we get a lesser duty for each one of them to perform. We could carry this to extremes, of course, and install rings over the whole length of the piston were it not for the excess friction drag that would be created, the increased wear rate of the liner, and also the fact that we get satisfactory results without a relatively large number of rings. We are not presenting formulas for calculating the theoretical number of rings to be used. We merely note here that for engines of the type, size and speed which we are discussing, six snap compression rings of the proper size have always appeared to be sufficient to give excellent service. We also note that four of the same type of rings do not give the same length of service that is provided by six rings, and it has been our observation that, other things being equal, the addition of another two rings to these pistons have been well justified. This is, of course, a very general statement and it is not intended to infer that four ring pistons do not operate satisfactorily. Rather, that in general the period between ring replacements may be increased by adding one or two more rings.

Some people have assumed, and some old texts have stated, that a definite total width of all rings as a function of cylinder diameter is necessary for sealing the pressure, and that this may be divided up amongst the total number of rings as desired. For example, these people might calculate that for a given cylinder diameter a total width of rings of 3" was required, and that it made little difference whether three one-inch or six half-inch rings were used for this job. This theory appears to have been pretty well exploded, for a ring will seal a definite pressure or cause a definite pressure drop across it, in a perfect cylinder, independent of its width. And on an imperfect cylinder or one which is distorted (as almost any cylinder becomes when subjected to running temperatures) the time required for the new ring to seal the pressure will vary in some proportion to its width. If this be true, the narrower the ring we can use the faster we can obtain our sealing. From the standpoint of the friction of the ring against the cylinder wall, we again want as narrow a ring as possible. From the standpoint of the mass of the ring causing inertia forces which tend to wear the ring grooves in the piston, we again score on the narrow rings. And from the angle of transfer of heat out of the piston to the cylinder wall, our limiting contact is between the ring and the groove. There is always better heat flow between the rings and the cylinder than there is between the ring and the groove, and therefore reduction of face width of the ring is not retarding this phase of the ring's functions. On every point the narrow ring shows superiority and brings us to the conclusion to work toward a larger number of narrower rings.

Discussing next the condition of the sealing surfaces, we find that the majority of the piston ring manufacturers grind the side faces of their piston rings to obtain perfection in sealing, yet sometimes we lose the effect of all this expensive procedure by placing these rings in grooves which are not properly trued.

SOMETHING WE *Never* FORGET—

GASOLINE plants must earn the maximum net profits for their owners! Simple statement of fact though this may be, its tremendous importance to you lies in the fact that the degree of net profit a gasoline plant will return to its owners is something decided *before construction is completed!*

Whether a plant will produce ordinary profits or maximum net profits is something developed on drafting boards, in design rooms, in material and equipment selection and in field construction. It is in the soundness of plant engineering that ordinary gasoline recovery finds elevation to maximum recovery. It is in the correctness of design that plant operating efficiency is developed to its highest peak and low operating and overhead costs are reduced to the absolute minimum. It is sound judgment in material and equipment selection that extends plant life over many added years. It is in quality construction and workmanship that plant maintenance costs are held to the lowest.

In the building of gasoline plants, this organization keeps ever in mind the fact that it has an obligation to its clients that goes beyond drawings, blue prints, equipment and material assembly. This organization holds firm to the belief that these are the means to gain an end and that that end is to so engineer—to so design—and to so build that plant owners are assured the realization of their basic objective—maximum profits through maximum production at lowest operating and depreciation costs.

PARKHILL-WADE
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973 NORTH MAIN STREET
LOS ANGELES CALIFORNIA

GASOLINE PLANTS

Ring grooves in old pistons should be carefully inspected before new rings are installed in them, and the bottom face trued up whenever it has become "veed". In our Company, it is customary practice to stock piston rings which have a standard oversize of width, as well as a standard oversize in diameter, so that when grooves need rematching we can enlarge them by 0.050" over their original width, and have available a stock of rings which are wider than the standard width by this amount. We go farther than this and have established two standard oversizes of width. It is needless to point out here that only the lower face of the groove affects the sealing, and therefore in a case where a cleanup cut is desired with a minimum of groove enlargement, only the lower face need be cut. Unfortunately, the removal of small amounts of metal is very difficult in the case of groove enlargements, for the skin of the metal will have become excessively hard, making it necessary for the machinist to get well under the skin in order to make a satisfactory cut.

It is customary for most ring manufacturers to leave the tool marks on the outer surface of their piston rings in order that they may quickly "lap in" and fit the cylinder. The practice of honing the finished cylinder walls is becoming increasingly prominent, and apparently it is meeting with marked success in reducing wear.

The ability of the ring to conform to the shape of the cylinder wall depends upon a simple principle, but apparently it is one which has been given the smallest amount of consideration. We cannot stress its importance too highly. When a new ring goes into service, it is of the utmost importance that it conform to the shape of the cylinder wall as soon as possible, for excessive "blow-by" will spoil the outer face of the ring, and, if it gets too hot, will cause the lubricating oil to carbon and stick the ring in the groove, preventing it from ever working. It is impractical to bore cylinders every time the rings are replaced. It is unlikely that cylinders which are true when cold are true when they reach running temperatures. Hence, it is necessary for piston rings either to distort or to wear out of round if they are to effectively seal. The most satisfactory ring is one which will do both and do it quickly, before "blow-by" has had a chance to spoil the ring for the rest of its life. The question of which ring will best conform to the irregular shape of the wall calls attention to the forces involved in piston ring loading.

If we consider the piston ring as a simple beam loaded throughout its length, then, no matter how the loading is applied, the deflection of this beam is always some inverse function of its moment of inertia. If it be uniformly loaded, the deflection is proportional to the product of the unit load by the cube of the length in the numerator, and the modulus of elasticity and the moment of inertia in the denominator. If the loading be somewhat different, the constants will be different, but the moment of inertia is always in the denominator. Applied to a piston ring, this means that the smaller the moment of inertia, the greater the ability of the ring to flex, or deform, or conform to an irregularly shaped cylinder wall. This statement, which virtually says "the smaller the section, the easier it will bend" is obvious without any technical proof, but if we will tie it up with our general beam formulas and check it against the moment of inertia it will give us a quantitative measure of how much the ring will bend, or how much more flexible a ring of one section may be that a ring of another section. Because the total load on the ring is proportional to its width, these factors drop out and we may consider that the flexibility is proportional to the cube of the wall thickness. For example, if we compare a ring of a certain wall thickness with another which is twice as thick, the heavier ring would have 2 or 3 times the stiffness based on thickness alone. We could thus expect the small ring to fit the cylinder wall somewhere around 8 times as fast as the large one. Qualitively we have proved this point in practice over and over again. Keep these factors in mind and remember that the flexibility of the ring varies inversely as the cube of its thickness. With this simple relation it is possible that many of your sealing problems may be overcome.

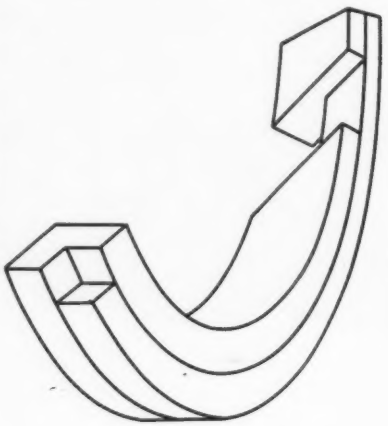

FIG. 2

In applying this principle of flexibility we are limited in small ring sections to the physical strength of the ring. We dare not use a ring which will have a fair chance of breaking up while in service. We must at least have enough wall tension to keep the ring against the cylinder. Also, when we make rings of reduced wall thickness we reduce the sealing face between the ring and the groove. Small rings are necessarily a compromise, but the increased ability of the ring to flex is of sufficient value to offset many other disadvantages.

Some piston ring manufacturers capitalize on the small size piston ring in a unique way. There are several different makes of rings on the market wherein a recess of half height and half width is cut out of what would otherwise appear to be a square snap ring. A small ring of one-fourth the section area is fitted into this groove. Most of the selling argument on this ring seems to center around the fact that the joint on the small ring is placed at a different point from the joint in the large ring, and therefore the small ring seals the end gap and thus makes the ring particularly valuable. As we shall point out later, we do not consider end gap to be of any material consequence in the Otto cycle engine of low compression ratio, hence, we are inclined to look further for the explanation of the cause of the effectiveness of this ring. We find that, applied to cylinders which are badly worn and which are approaching the condition for which a rebore is necessary, rings of this type in the last groove or two grooves frequently stop the blow-by in several hours and give a good running life to the set of rings, despite the condition of the cylinders. This presents an excellent illustration of comparative operation between two rings, one of which is half the wall thickness of the other, and we attribute the effectiveness of such rings to their increased flexibility.

We have also experimented with the much condemned practice of filing the face of a ring in order to make it conform to a badly worn out round cylinder. We find a goodly measure of success in this practice in certain places. We use a special tool for holding the ring firm while it is pushed back and forth in the top or front of a cylinder, the barrel of which has been blued, and after the ring has been filed and fitted, we dowell or pin it so that it cannot turn on the piston. Rings so fitted are thus "hand

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sealed" to a great extent, and become lapped to the wall in a short period of time. Contrasting performance in such cylinders between rings which will readily conform to the cylinder wall and rings which will not, the ring which does not quickly conform to the sealing surfaces must stand more "blow-by" with resultant sticking, as we have noted previously, and the proper seal is never effected.

After all the factors which we have discussed have been considered and piston ring installations have been made which may appear to be favorable from these considerations, the final requirement must be satisfied or all of the care which has been exercised in selection and adaptation will be to no avail. The freedom of the rings to function as they should under operating conditions demands that they be loose in the grooves and have the proper end clearance. It seems to be a universal fault that engine builders and users alike try to run piston rings without what we consider to be sufficient side clearance in the grooves. It is our opinion that ring sticking which is the usual result of insufficient side clearance is brought about by the distortion of the piston under temperature.

We have many times seen pistons which were accurately made go into a lathe after being run a short while, and the crookedness of the grooves is often amazing. Rings which appear to have plenty of side clearance when installed find themselves held fast by their top on one side and by their bottom face on the other side of a distorted piston. Prevent a ring from working freely in its groove and it becomes stuck very quickly. Fortunately, the quality of iron and the available alloys for piston castings, coupled with more widespread use of proper annealing over the past decade has markedly improved the pistons. However, we have never been able to find any material damaging effect of excess width in ring grooves, even in a test where the grooves were 1/16 inch wider than the rings. We don't recommend such a clearance, of course, but we do feel that concern over the possibility of grooves being too wide in single acting slow speed engines has been greatly exaggerated. We appreciate the inertia forces in high speed engines, and where soft alloy pistons are used, but in slow speed machines, although the grooves must be cleaned up occasionally, we feel that widened grooves greatly prolong the life of the rings.

In answer to the question of how wide the groove should be, we would say that the top or first groove must be wider than the others, and that the width of this groove depends largely upon its location. If the top groove is very close to the top of the piston, within the first inch for the sizes in which we are interested, then it runs relatively hot, has a greater opportunity for distortion and a better chance to carbonize the oil and stick the ring. Where one has the opportunity to designate where the ring grooves should be, then by all means move the top groove down as far as possible. In some of our horizontal engines we have made up our own pistons and have moved the first

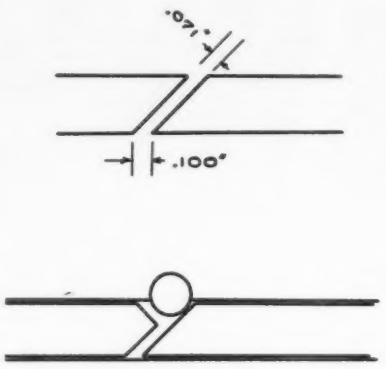


FIG 3

groove from one inch to 2½ inches from the piston head with excellent results In engines 10 and 20 inches in diameter we find the best ring operation with 0.012" to 0.015" side clearance in the first grove. We have learned to appreciate that the prime function of the first ring is to "break the fire" and we look to it to protect the remaining rings. We do not expect much from it in the way of sealing, and we give it wide groove clearance. The second groove can be the same width as the first or 0.002" to 0.003" narrower. If we leave 0.005" or 0.006" clearance for the bottom ring, or both oil rings, as the case may be, and space the intermediate grooves at proportionate increments between the bottom and the top, great freedom from ring sticking can be obtained with no noticeably harmful results due to the wide grooves.

Perhaps as much trouble occurs from insufficient end clearance as from insufficient groove width. At least it is a "runner up". Those that worry about loss of power through the end gap of their piston rings should take the trouble to note the end gap of some of their well worn rings in engines which are still giving good output. Yet unfortunately there are still some mechanics who would make their piston rings practically butt if they could get away with it. There are times when the top ring may reach temperatures 300° hotter than the cylinder wall, and at this condition the ring must expand more than 0.006" for every inch of diameter. If the ring butts while in service, something must give. The usual result is a badly gouged and scored lined, badly worn rings, and a hot engine during the "wearing away" period. We once ran a test on one of our 20" double acting engines in which we installed rings with end gaps accurately cut to give end clearances of .006", .009", .010", etc., per inch of diameter. When these rings were removed we found slight evidences of the ends touching with gaps as large as .008" per inch. From this test we determined upon a standard end gap for all rings of .10" per inch of diameter, regardless of where they might be used.

There are many types of end joints available. Perhaps the safest to use is the plain square cut ring. We have never favored the step cut joint due to the possibility of the end breaking off. We have standardized upon the angle cut ring in our company for two reasons: First, because for a given amount of lineal end clearance, the cross section area for leakage is only .7 that of a square cut ring. Thus, on a basis of .010" per inch of diameter end clearance, an angle cut ring for a 10 inch cylinder would only require a gap to be .071", whereas a square cut ring would have to be .100" across the gap. An angle cut ring lends itself to ease in dowelling, for it is only necessary to saw off one point to make a good notch.

With regard to dowelling or pinning of rings, there will always be room for much argument. There are some conditions, however, where dowelling appears necessary, and some where dowelling does not appear to work. In two cycle engines where the ends of the rings can pass over ports and break off by catching at these points, it seems advisable to pin the rings so that their ends will be kept free of this hazard. Where the rings are filed to fit an irregular shaped cylinder wall, as previously described, it is quite necessary to pin them, else they may turn in their grooves and be much worse than if they had never been filed. We have tried several times to pin the rings in our large double acting engines, but with no success. The rings immediately sheared the dowells and broke into small pieces. A manufacturer's test engineer operating large two cycle double acting diesel en-

gines through their guarantee period recently told me that his concern had repeatedly attempted to pin rings on such engines, only to meet with no success and immediate breakage of rings. Their solution on protecting the ends of the rings was to file off the sharp corners for some distance back from the ends. We understand that one manufacturer of fine automobiles has always pinned his rings. If rings are to be pinned, care should be exercised that the pin does not prevent some freedom of movement, else they will likely stick in the grooves.

With regard to cylinder lubrication, we would caution primarily against too much of it. So frequently oilers feel that "if a little is good, more is better", and their tendency is to pour excessive amounts of oil to power cylinders, particularly during the "break in" periods. In engines with injectors into the cylinder walls where such action is possible, it very frequently results in rings being stuck before they ever have the opportunity of going to work. It has been our experience that drastic methods were sometimes necessary to keep operators from flooding power cylinders with an excess of oil, particularly during the critical "break in" period. In independently lubricated cylinders the operator must always know his rate of feed of the lubricant, and his observation of the condition of the cylinder walls when pistons are pulled will dictate what rate of feed is sufficient to maintain the desired film.

If we are to summarize the important features which we have attempted to emphasize, we might say that in general for good practice the following illustrations hold: Use as many rings as is practical and keep them well away from the head of the piston. Use the smallest ring which will stand up in service, keeping in mind that to seal, the ring must touch the wall throughout its periphery. Keep the grooves true and in good shape, and allow ample side clearance betwen the ring and the groove, leaving wider clearance for the hotter grooves. And don't neglect to leave generous end clearances. Observance of these simple rules and care to provide intelligent lubrication will usually result in giving the piston rings a break in their effort to provide you with extended periods of service and satisfaction.

Representative Macwhyte Co. in California

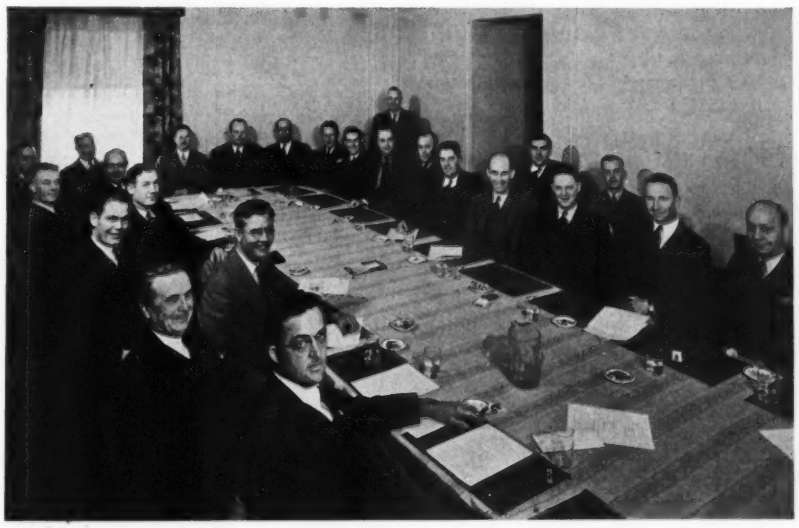
Left, H. F. Parker; right, Dewey Barber.

An announcement of considerable interest to California production men has just been made by H. F. Parker, factory representative of the Macwhyte Co., of the appointment of the Production Equipment Co. as exclusive California oil field distributor for the entire line of Macwhyte drilling lines, rotary, casing and sand lines.

Macwhyte Co., one of the leading wire rope manufactors of the country, will be represented by C. W. Jackson, whose responsibility it will be to work very closely with their new sales and service outlet.

Dewey Barber, president of Production Equipment Co., states that the entire Macwhyte line will be carried in stock at the general warehouse as well as at the field stores of his company.

Union Oil Asphalt Sales Representatives



Union Oil Co. asphalt sales representatives, shown above, gathered in San Francisco at the Sir Francis Drake Hotel recently for a three-day session. The first day was spent at Oleum where the group was conducted through Union's refinery. Remainder of the session was spent in San Francisco.

Natural Gasoline Study In Wilmington Covers Possibilities In Older Properties

Of real interest to operators and land owners in the townlot section of the Wilmington oil field is the following information which is made available by John M. Abrams, president and manager of Inglewood Gasoline Co.

A comprehensive study of gas volumes and gasoline contents together with other important technical data, has just been completed by Ralph Newton, gas engineer, assisted by James Dunn, field engineer, and Karl G. Steinbeck, superintendent of Inglewood's operation in the Potrero oil field. This supplements work done last Fall by John Hicks, gas technologist, and Mr. Steinbeck.

The survey covers 139 wells in the older portion of the field, divided, for convenience, into eleven sections. Among the operators listed are Sun Ray-Royalty Service, Getty, Selegna, Pacific Western, MacMillan and Jergins.

The report for each well embraces daily volume of wet gas, content of stabilized gasoline, estimated total gas and gasoline production at the end of first, second, and third years; cost of pipeline tie-ins, and estimated revenue from gasoline and gas during the basic 3-year period. Future gas volumes were estimated by reference to a conservative decline curve developed by Messrs. Newton and Dunn. This was somewhat difficult to prepare by virtue of the fact that most of the wells in the field are flowing and a substantial change in the decline curve was made in order to provide a reasonable margin to take care of pumping period in the future. The concensus of opinion among qualified petroleum engineers gives this heavy field long life.

The experts did not attempt to estimate the number of wells which may be deepened or drilled into the Ford zone where substantial volumes of rich gas have been developed.

The following was derived from the survey:

Total wells tested: 139.

Daily gas volume, 12,765 M.C.F.

Daily gasoline volume, 7,950 gals.

Average daily gas volume, per well, 92 M.C.F.

Average daily gasoline volume, per well, 57 gals.

Average gasoline content, 0.620 gal. per M.C.F.

In order to provide a conservative basis for an initial operation, a group of selected wells was chosen at strategic points on the trunk gathering lines and show the following information:

Total wells selected: 43.

Daily gas volume, 6,205 M.C.F.

Gasoline volume, 5,940 gals.

Average daily gas volume, per well, 145 M.C.F.

Average daily gasoline volume per well, 138 gals.

Average gasoline content, 0.952 per M. C.F.

Making estimates from this basis it was contemplated by the company that the remainder of the producing wells would be tied into the gathering system in the course of ten months. A total of 12 deep wells during the same period was added. These deep wells produce from 150 to 300 M.C.F. of gas per day with a gasoline content ranging from 2.5 to 3.8 gasoline per thousand cubic feet.

Inglewood Gasoline Co. owns a complete plant, purchased from State Gasoline Co., in the Signal Hill oil field. This plant, with some changes, is capable of handling all of the gas from the wells included in the engineers' report. Moving the Signal Hill plant, installing wet and dry gas lines and making hook-ups to all of the subject wells, will cost approximately $135,000. A tentative application for a loan from Reconstruction Finance Corp. has been filed by the company. Careful estimates of potential revenue, based upon data from the field study and low royalties to producers, show returns that well justify the undertaking. However, at an early meeting of the board of directors the report will be considered and final decision made.

Nevertheless, offsetting low royalties there are distinct advantages to the installation which have already been recognized by several of the important producing units in the area. The fire commission of the City of Los Angeles has been aware of the hazard, under certain conditions, of the unrestricted blow of waste-gas in this section of the city and could reasonably require that means be provided to eliminate the danger.

If a gathering line is installed, gas, which is now being wasted to the air by most of the operators, would be returned as fuel by the gasoline company for use on the leases. The wet gas is now being wasted, for the most part, due to the absence of gas traps. Inglewood Gasoline Co., under its present plan, would install separators or traps at all wells in order to capture gas wasted at the de-sanders and production tanks. The engineers have developed and tested a float-controlled oil-discharge valve which is not seriously affected by sand. Arrangements will be made with the smaller operators whereby the cost of installation could be retired out of the royalty income. Under present field practice sand trouble has been minimized, on both flowing and pumping wells, by the use of flow-beans. With the proposed hook-ups to gas traps back pressures of 40 lbs. or 50 lbs. per square inch can be carried. The manipulation of traps will not only deliver wet gas into the gathering lines but also hold back sand-flow from the well. This practice, in the opinion of production experts, will become of increasing importance during the life of the field.

Inglewood Gasoline Co. at present is producing 3,000 gals. per day from gas wells in the Potrero field, operated by Associated, Wilshire, Belloil and others. The company also has a substantial investment in two wells drilled by Crude Oil Drilling Co. in the Wilmington field.

Stringent regulations against private drilling near Federal oil deposits have been issued in Washington by Secretary of the Interior Ickes.

Vladimir N. Ipatieff, director of chemical research, Universal Oil Products, has been appointed to represent Northwestern University at the Tenth Annual Congress of Chemistry, to be held in Rome, May 16.

Dr. Walter Dill Scott, president of the university, has just notified Professor Ipatieff of his appointment.

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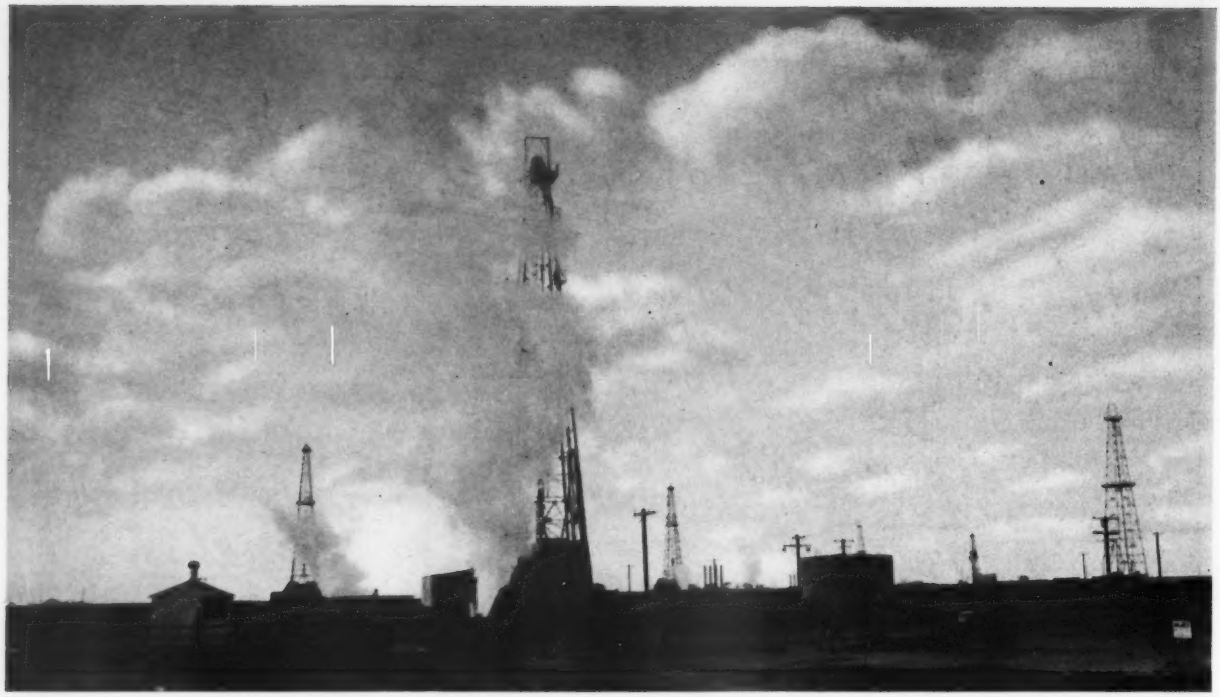

Panoramic View of Rio Bravo

This remarkable picture, snapped by R. E. Collom of Continental Oil Co., shows strikingly the flat topography typical of San Joaquin Valley floor fields. From left to right, the wells are: Superior Oil Co. Wagner No. 2, General Pet. Corp. Wagner No. 1, Superior Oil Co. Wagner No. 1, Union Oil Co. Kernco No. 1-34 (discovery well peeking over the tank), Union No. 2-34 and Superior Oil Co. Geissinger No. 1. At the time this picture was taken, this group embraced the three deepest producing wells in the world, but since, Mr. Collom's company has bettered the record by nearly 2000 ft. The old adage "Time is money" never is truer than when applied to the oil industry but an entirely new significance is attached to the phrase by the Superior Oil Co. which completed two of the wells here pictured at depths just short of 11,300 ft. in less than 90 days each. Wagner No. 2 shown drilling is now in the process of completion while Wagner No. 1 and Geissinger No. 1 are producing as is the discovery well.

Refiners Organize To Cut Cracking Insurance Rates

More refiners are joining the fight to reduce unfair fire insurance rates on cracking units for refiners who avail themselves of independent technical inspection service.

The records show that over a period of eight years the ratio of losses paid to premiums collected on independently-inspected cracking units has been 15 percent, whereas the normal average loss ratio on all classes of property is 50 percent.

In other words, the insurance companies have collected a dollar from such refiners for every 15 cents they have paid in losses.

A committee of Texas refiners headed by Roy B. Jones, president of the Panhandle Refining Co., Wichita Falls, has presented a strong protest against unfair rates to the Texas Fire Insurance Commission.

Other members of the Texas committee are: W. D. Richardson, Cosden Oil Corp., Fort Worth; Ray Woolf, Shamrock Oil & Gas Corp., Amarillo; Ben B. Piepgrass, Solvex Refineries, Gladwater; Capt. J. F. Lucey, Talco Asphalt & Refining Co., Mount Pleasant, R. E. Hall, McMurray Petroleum Corp., Tyler, and J. D. Bright, Waggoner Refining Co., Vernon.

A committee of Oklahoma refiners has also been formed, with Albert Finston, president of Bell Oil & Gas Co., as chairman, to present the matter to the State Insurance Board. Committees are rapidly being organized in other states.

The unfairness of the rates charged for cracking stills which are inspected by an independent technical agency is apparent, the refiners point out, when it is considered that the expense is borne entirely by the refiners, whereas, in the case of steam boilers the insurance companies spend from 45 to 55 cents of every premium dollar for inspection service.

This fight for fair insurance rates on cracking stills started three years ago when several Dubbs licensees, because of their own favorable fire loss experience, attributed to independent technical inspection service, which cost the insurance companies nothing, urged Universal to investigate the effect of independent technical inspection service on fire loss.

This was done, and Universal presented a complete appeal, based on the data collected, to the Fire Insurance Executives Association, with no result.

The dissatisfied refiners have now taken the matter in their own hands and are aggressively presenting their claims to the insurance authorities in their respective states.

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Valves . . . How Important Are They?

By Alex L. Robb
Vice-President and Director of Engineering and Sales, Jadson Motor Products Company

1. *Important,* because the conventional engine requires it as a fundamental structural element.

2. *Fairly important,* because it constitutes one of the frequent major service and replacement problems which create an operating expense even though quite small as compared to brakes for instance.

3. *Rather unimportant,* as the entire elimination of this service and replacement cost would not materially reduce the operating cost per mile.

4. *Rather unimportant* at this day and age since good reconditioning practice and good valves have pretty largely eleminated the costly road failure.

5. *Unimportant* evidently since with few exceptions the answer to "Are you having any valve troubles?" is "No."

The above statements, which unfortunately represent a fair cross-section of prevailing opinions, could therefore sum up to give a general conclusion that the valve problem is relatively unimportant and therefore not worth taking time out from the important considerations of fuel prices and ways and means of increasing the miles per gallon, to give it thoughtful study.

During these many years, however, that valves have been accepted as being satisfactory and unimportant, there have been those of us in the industry who have not only been interested in developing materials and improving manufacturing to keep pace with the ever increasing duty to which the engines and therefore the valves have been subjected, but have held as a premise that the valve and its related parts have constituted something that was vastly important by virtue of its indirect effect upon, and relation to, the other fundamental elements of the engine, the fuel and oil costs, and the ultimate life of the engine.

The literature on this subject of valves has quite largely dealt with reconditioning and reconditioning equipment, and these instructive papers by capable contributors have been most helpful to the transport industry as well as to all engine operators, in attaining the condition of eliminating the costly failures cited in statement "4."

Any discussion of the valve problem necessitates distinct classification of the engines based upon the duty they are to perform, as well as the specifications of the engine itself. The multitude of such combinations in use makes it impossible to consider engines under the general classifications of bus, truck, tractor, passenger car, industrial, marine, etc.

What we get when valve temperature exceeds the resisting point of the valve material.

For our purpose three practical classifications, which will not exclude any engines, will be created. These classifications will be based upon the combined mechanical and thermal distortions of the engine elements occurring under *normal operating conditions.* Let us call them: (A) low order of distortion, (B) severe order of distortion, (C) excessive and impractical distortion.

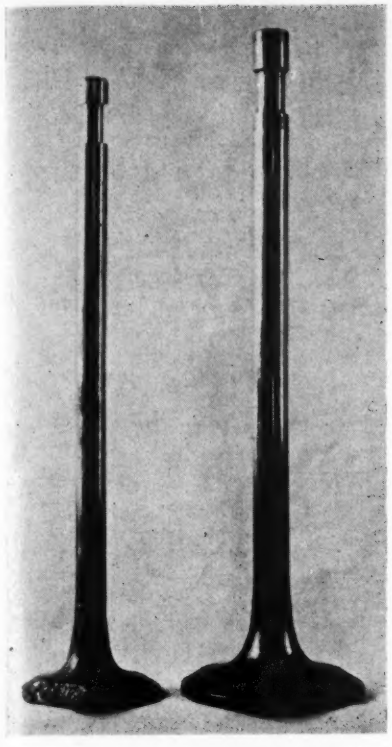
Presumably this is addressed to only those operators of engines who, due to competitive conditions, are interested in total costs per mile or hour of operation, therefore classification "A" will be eliminated as it does not affect this group to any appreciable extent. Classification "C" eliminates itself as it has no place in intelligent operation, alhthough unfortunately there are many engines operating in this group and they serve to give the engine industry at large a black eye and hinder the sale of engines.

The successful commercial operators of transportation and stationary engines are attaining this success by operating engines in our "B" classification, which was defined relatively in terms of distortion as *severe.* There are a few exceptions of course. Air cooled aviation engines for instance are largely in classification "A" to which our discussion will not apply.

The success of an engine design and the operation of it, therefore, are based largely upon the designer's and the operator's knowledge of distortions, enabling them thereby to keep the engine from falling into the "C" classification. Unfortunately the complexity and magnitude of the subject has prevented all designers and operators from acquiring sufficient scientific of these complex relations, and consequently still prevalent in the industry are certain accepted standards and theories that have as their foundation a mass of data taken from the book of operating experience to which the engineer, the practical mechanic and the layman have contributed. Day by day we see some one of these antiquated acceptances give way to science. any of the changes are fundamental in nature and emanate from the marvelous researches being carried on in all branches of science. The modern engine as a result of these developments is doing a splendid job and the rapid progress is serving as a stimulus to still more intensive endeavors which will unquestionably result in engines for the not distant future that will be smooth, efficient and reliable to an unbelievable degree.

During the years of engine development, valves have kept pace largely due to the improvements in materials and manufacturing methods and today an exhaust valve made of one of the expensive high alloy Silcrome steels and having exacting specifications for dimensions and finish is sold for considerably less money than the crude part made of low cost cast iron or mild alloy steels, which of necessity was furnished less than twenty years ago.

A word needs to be said at this point about exhaust valve materials. Development of materials under the Silcrome patents has been tremendous and has made possible the group of materials having physical properties that are *entirely adequate for normal operation* of every type of engine in service under classifications "A" and "B." It is regrettable that space does not permit digression to relate in detail something of this contribution. In this brief reference to valve materials note that the words "normal operation" were used. In this marvelous steel development, producing heat and corrosive resistance, high strength and resistance to fatigue failure at the elevated temperatures, there has remained however one physical



And here's what happens when increasing leakage and increasing temperature are maintained. The valve melts.

property that has not materially changed. That property is the melting point which is in the nature of 2,650 deg. F and will be mentioned later.

Normal operation for present day high output engines need not produce valve temperatures higher than 1,500 deg.-1,600 deg. F in our "B" classification, therefore melting point definitely has no significance in normal operation, and if as stated the other physical properties are adequate for these normal operations, it leaves only the *important curse of abnormal operation* as the sole cause of valve failures.

Assuming, therefore, that advantage is taken of the proper available material and eliminating that occasional failure due to the lack of absolute infallibility of the human, we can truthfully and conclusively say that valve failure has only one cause—*abnormal operation.*

Let us list the abnormal operations that affect the valve and produce failure: (1) valve leakage, (2) reciprocating motion of valve, not that intended by cam design, (3) audible and inaudible detonation, (4) rotation of a valve (this is really a subdivision of No. 1), (5) valve guides or valve stem worn beyond some certain established limit (subdivision of No. 2), (6) excessive temperatures due to improper distribution or fuel ratios, (7) loss of coolant or impairment of coolant system.

Unfortunately there has been an acceptance of valve failures of the type that require only frequent reconditions and tappet adjustments. Perhaps this is largely due to tradition dating back to the time when we got a real thrill out of spending Sunday morning "grinding the valves." This type of failure is not even alluded to as trouble. Let a valve break, however, and cut an engine in two nice halves, or even perhaps have one melt a side off half way up the grade, then it is trouble with the oft repeated gnashing of teeth and presenting of bills. With the exception of the group previously mentioned, largely there has been nothing done about these frequent failures except improvement in servicing. As a splendid illustration that much can and is being done by men in this progressive group, with rapidly increasing results, I wish to quote Mr. R. M. Ahrens, general superintendent of Pacific Greyhound Lines. "I agree with your theory that valves are an important element and that if they could be made to operate through long periods without leakage, considerable money could be saved in maintenance expense as well as performance, fuel and oil consumption. During the year 1935 we operated 26,319,310 miles and purchased 3,426 valves. During 1936 we operated 31,416,954 miles and purchased 2,983 valves, which netted us a saving of $1,120.00 on valve purchases during 1936."

Space permitting, I would like to have quoted from other influential men in this group of manufacturers and operators, as their experience also proves beyond question that valve leakage is a silent robber and that the losses are considerably more than the valves themselves.

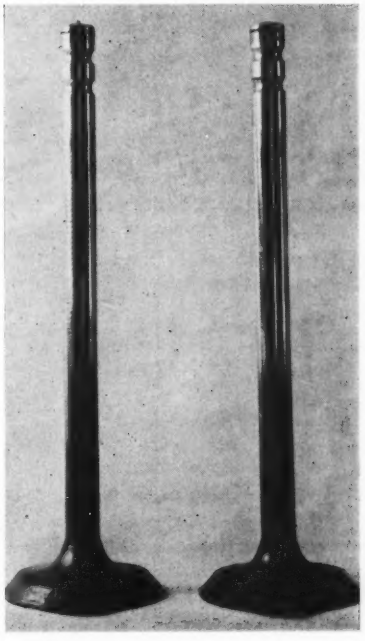
Accepted frequencies of reconditioning valves varies from 5,000 to 50,000 miles, therefore a fair average say is around 20,000 miles. Where effort has been made to change this condition, we have on record consistent 100,000 to 150,000-mile operations without any valve attention. In development work involving complete control of materials and designs of the combined parts of the entire valve system, we have engines that have operated continuously for as much as 12,000 hours which translated to road service at 40 miles per hour would be near 500,000 miles or half the accepted good life of a heavy duty transport engine.

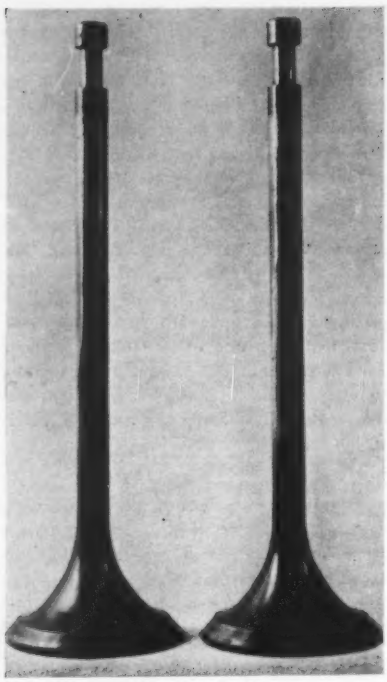
If the valves require reconditioning at 20,000 miles say, then to require it they must have failed, and this failure was caused by leakage. Progressive observations show that this leakage did not just happen at 19,99 miles, but was progressive and started around the 5,000 mile mark, increasing in intensity until it reached a certain point and then a rapid acceleration of the failure occurred. This condition is illustrated below. The operation of the engine then from the 5,000 mark on to the 20,000 is abnormal. What then may be the extent of this abnormal condition and what may result? First, the leaking gas has a temperature of 3,000 deg. to 4,000 deg. F. The valves increase in temperature and reach a point above that which the valve steel can resist. Illustrations on left depict such a condition. Increasing leakage with increasing temperatures soon reach that melting point of 2,650 deg. F. mentioned before and melting as shown in the illustration are the normal result. So much for the valve, it's gone.

The valve seat unless it be of the deep type where the depth is at least twice the radial thickness, will unquestionably be loose, regardless of the material from which it might be made or the method by which it might have been installed, so it has gone along with the valve. This concentrated flame passing between valve and seat is not unlike an acetylene torch flame within the combustion chamber.

The hot valve, valve seat and local hot spot of the head or cylinder structure can and do entirely upset the combustion characteristics producing first inaudible and then audible detonation with its resulting contribution of added and ununiform heat-

Rapid attack. This condition developed between 3,000 and 4,000 miles of service. The second valve gave 150,000 miles of leakage-free performance.





A pair of exhaust valves (C) that have given the equivalent of half million miles of service without leakage or valve adjustment.

ing of the surfaces as well as the increased pressures and bearing loadings.

Now for distortions. Normal distortions in classification "B" were defined as severe. The individual parts of the engine are made to the designers' specifications and the assembly drawings also these parts having easily measurable dimensions assembled into their desired relationship, but how unfortunate that this assembly drawing does not picture the relationship when the engine is operating.

Distortions, plenty of them, mechanical and thermal, are constantly changing with every speed and output variation. Every stress in the engine, whether produced by pulling down the cylinder head studs, an inertia force, a centrifugal force, an exploding pressure, produces a deflection in the parts affected. These changes of shape are bad enough, but that's not the half of it. All these parts, mostly unsymmetrical, are then subjected to varying ununiform temperatures which produce shapes that would be impossible to lay out with dimensions. Stress changes also accompany every thermal distortion.

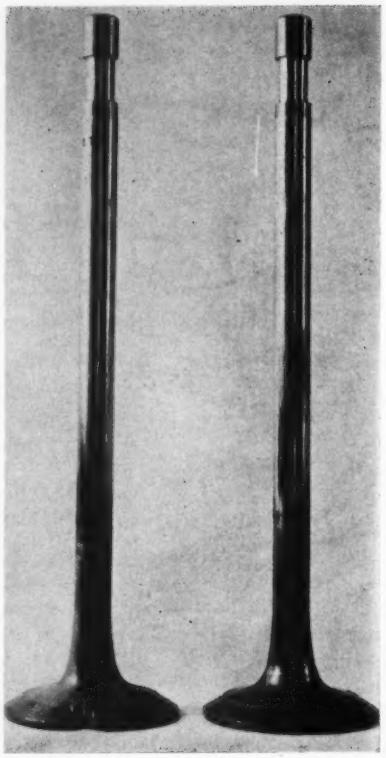
These fits and shapes must be established for some normal maximum distortion, and they are: partly by calculation and partly as stated before by the practical method. When the abnormal stresses and thermal distortions due to valve leakage that have been mentioned occur, they produce the straw that broke the camel's back. Perhaps the added stress cracked the cylinder head or block. Perhaps the added bearing load under detonation was just a bit too much for a rod bearing or a crank shaft. Perhaps the added temperature and change of cylinder shape made just enough change to start the drag on the piston which only required a start to produce its own destructive seizing temperatures. Perhaps only excessive blow-by with bad crank case contamination occurred. If it were only any one of these and the many more conditions that could be laid at the door of leaking valves, it would be well worth the effort to eliminate valve leakage and reduce operating costs thereby.

Oil companies have suffered unjustly from reports of valve corrosion and build up of lead compounds on the valves. Leakage again; as at excessive temperatures attacks and build ups do occur. Illustrated at right a typical case of very rapid attack in some 3,000 to 4000 miles on an exceptionally resistant valve steel. The same fuel had no effect upon the same valve steel when leakage was eliminated.

If we have valve materials that will resist normal conditions but cannot resist melting temperatures, if our engines cannot stand the stresses and distortions due to valve leakage, if we have fuels that are adequate for normal conditions, and if it is possible to largely eliminate accepted valve leakage, then does it not seem more logical to make the effort to prevent leakage than to attempt to produce materials that will resist abnormal temperatures and to assemble engines to withstand abnormal distortions and loadings?

No simple and cheap nostrum can be offered to eliminate valve leakage as it can only be accomplished by the continued application of fundamental, thermal, metallurgical and mechanical principles. Contributions from these fields have already made possible tremendous strides in attaining this end. Some of the new models of engines developed for commercial transport, marine and stationary applications, are showing marvelous valve performance. Many operating companies have also taken available valves, valve seats and valve guides, which, coupled with controlling the valve motions, have produced startling results. Illustrated left above are a pair of exhaust valves from the experimental development project by the author which was previously mentioned as having the equivalent service to nearly 500,000 road-miles without valve leakage or tapped adjustment.

Something of the problems involved in



Excessive temperatures make the valve a danger point for the engine. Leakage is responsible for failures blamed on fuel.

eliminating leakage may be better understood by thinking of a valve with a beautifully ground, accurate cone which when assembled in the cylinder head or block mates with another accurately ground cone of the seat in such a way that they may be gas tight and will show uniform mating when very light coatings of prussian blue are used as an indicator. The valve seat will quite likely be concentric with the guide bore to 0.001 or 0.0005 on the indicator. The head is boltd on. It seems a shame to spoil that lovely accuracy but instead of a cone for a seat we now have some elliptical conic shape. The plane of the seat has shifted out of normal with the guide bore and as for concentricity with the guide bore—that's something else again. Now we are ready for the normal temperatures from operation. Perhaps these distortions will correct the others, but quite likely it will be the reverse. A great contribution to the operator has been the recording type of cylinder head wrench enabling duplication of a control of distortion. In some cases an elimination of distortion has been possible.

Depending then upon the type of distortion present in the particular engine will the types of materials and designs best adapted for valves, valve seats, guides, etc., be determined for the purpose of ac-

commodating this shifting of shapes. The great variations between makes and models of engines precludes any possibility of establishing standards for valve and seat, so it is usually necessary to make several corrections or changes on each new project. In establishing the necessary changes, interpretation by observation must be made before complete failure occurs, for the same reason that it is usually impossible to tell where the fire started in the barn if you return to find a pile of ashes.

Perhaps equally important to controlling leakage is complete control of the mechanical motions of the valve ("2" under the listed abnormal conditions responsible for failures) as not only is this necessary to prevent breakage of valves and damage to the retainer grooves, but is the first essential in the battle to prevent leakage.

The cam contour and the tappet clearance not only establish the valve lift and the timing points of opening and closing but also establish the velocity of the valve for every position in its reciprocating motion at any and every speed. With this information then, why not determine how severe so-called pounding of valves actually is, now that we know what velocity the valve has when it strikes the seat on closing at maximum r.p.m.

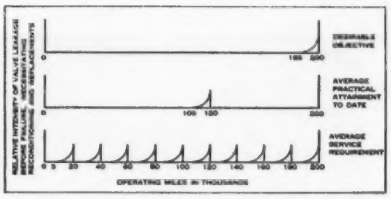
Take an average 2,500 r.p.m. and convention cam design with perhaps 0.010 tappet clearance and calculations will show this speed or velocity not to exceed 1½ ft. per second. To demonstrate this velocity hold a valve or any object ⅜ to 7/16 of an inch above your glass topped desk and let it fall. This demonstration will definitely show that in so far as pounding is concerned, the valve and seat could be made of lead and no damage would be done. This is normal operation but it is a different story if the valves do not follow the cam, which they will not unless the valve spring is sufficiently stiff to make it do so at the highest speed the engine may ever reach whether coasting in gear or in actual operation.

If the valve is not forced definitely to exert pressure on the cam through the lifter assembly, the valve will then strike the seat at a very high and damaging velocity. Such a speed or velocity will be in the nature of from 8 to 12 ft. per second. This velocity may be represented by dropping the valve 18 to 20 in., but do not try it on your glass topped desk. Is it any wonder valves break, pound seats and damage keeper grooves? Increased valve stresses under such a condition may be compared exactly to the stress increases in a connecting rod of a 2,000 r.p.m. engine if you increased the speed to 10,000 r.p.m. No one would expect the connecting rod to stay in, but a valve is quite universally classed as defective when it breaks.

Valves of the conventional design nearly always break at the exact junction of the straight stem and the radius under the head, and this is where it should break due to a concentration of stress at that point. This fact should create suspicions on the part of hte operator as it would be utterly impossible for the valve manufacturer to always locate the defect in exactly the same place. Just blame the valve motion. When it is so simple to calculate the necessary spring pressure, there is no excuse for not entirely overcoming this difficulty. Just buying new springs of original specification is not enough as many specifications, particularly of older engines, were not correct. This has been largely due to not making sufficient allowance for the variable factor of friction between the stem and the guide.

Other irregularities due entirely to weak valve springs are rotating valves and damage to retainer grooves. After discussing the distortions of valve seats, particularly the tipping of the entire seat, it is evident that the valve if it is going to seat, must bend under the head to let the valve head tip a corresponding amount. Those who do not realize this condition, usually attribute this change of shape to warpage. Measuring with a dial indicator the amount of this bend is one of the methods we use in measuring the amount of distortion of the seat under normal service. It is very evident therefore that a valve must not rotate, otherwise it would have to be continually bending and at a fast enough rate to keep pace with the rotation, which it will not do, therefore leakage due to not seating must occur. The marks of the guide on the stem will always show if the valve is rotating or staying in one position. Any breakage in grooves, holes or slots used as a retaining means or any wear or damage to the valve surfaces by the retainer is also proof positive of weak springs. The multitude of design and heat treatment specifications for the retainer means on the end of a valve stem is perfect evidence of the past unsuccessful effort to force these small surfaces to stand up under impossible conditions.

A typical case will illustrate this and since it is ancient history, no offense will be taken. An early engine manufacturer used a ⅛ in. hole and a pin which gradually wore and then broke or sheared off. This was presumably corrected by making a large slot and using a flat keeper to replace the pin. Having more metal than the pin, the flat keeper lasted longer or in proportion to the cross-section; provided the end of the valve did not break first since the wider slot reduced the cross-section of the end of the valve. This installation had a 50 lb. spring. Increasing the spring to 140 lb. and using the valve with the ⅛ in. hole and a wire nail as a keeper, operation fails to even mark the nail. Instead of deep grooves cutting a stem almost in two and complicated heat treatments, shallow groves on very soft stems are entirely adequate if the seating velocity of the valves is controlled by adequate springs.



The motion of the valve just discussed assumes from a design standpoint that this reciprocation is along a fixed axis, which is true within the limits of the guide clearance. The lateral motions occurring when guides or stems wear constitutes a failure which will prevent seating and will result in leakage. In working therefore for long periods between reconditions that are past the normal life of conventional guides, it becomes necessary that this life be also increased proportionally. A new engineering material "Nitricastiron" is filling this requirement by apparently proving a permanent installation when used as a guide and it also prevents wear on the mating valve stem regardless of the type of valve steel.

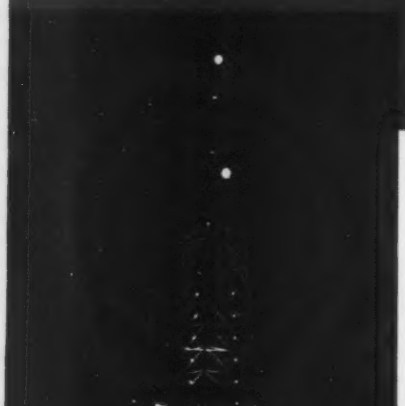
C. W. Timmons Elected American Pipe & Steel Chief

Colin W. Timmons has been elected president of American Pipe & Steel Corp. succeeding the late J. E. Graves.

Mr. Timmons was formerly vice-president and general manager and has been with the company since 1925.

Gerald Graham has been elected executive vice-president. Mr. Graham came with American Pipe & Steel Corp. from National Supply Co. in 1928 to take charge of the oil field division. He became a director of the company in 1932 and general sales manager in 1935.

Morgan S. Burrowes, secretary-treasurer, has been with the company 31 years. Mr. Burrowes is the oldest member of the organization in point of service—dating his connection since early days of old American Steel Pipe and Tank Co., predecessor of the present company.



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4-38

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

Field Development

Los Angeles Basin

Wilmington Output Situation Is Improved

Encouraging to the market picture as a whole is the present trend in the Wilmington field. Although completions reached a new high of 18 during the past two weeks, the number of drilling wells was reduced from 38 to 30, and through a new "gentlemans agreement" among Terminal zone producers in the Long Beach harbor, deep zone wells are now being held to a maximum of 800 bbls. The latter circumstance is largely responsible for the maintenance of total field production under the 100,000-bbl. mark, a figure much in excess of the allotment set for the field, but not unreasonable when considered in the light of the total potential of the area. That field actively will continue to decline gradually is seen in the greatly reduced number of available drill sites. No important extensions have been made recently in the old Wilmington field and the Terminal zone area in the Long Beach side is now fairly well defined, with lease requirements nearly fulfilled. Though much larger in area than the lower horizons, the Ranger zone does not offer sufficiently large rewards to encourage a major drilling campaign and it seems reasonable to expect that the outlying portions will be developed in an orderly, routine manner. The co-operative attitude of Terminal zone operators in the harbor "Hot Spot" may well be pointed out as the answer to those who advocate production control by law.

Largest of the newer completions was No. 72 of the Union Pacific Railroad Co. which was brought in with an initial flow of over 10,000 bbls. The well, located due south across Cerritos Channel from the Ford plant, was finished at 3985 ft. flowing from both Terminal zones, the Ranger being cased off. Five other good wells were completed in the lower horizons, General Petroleum Corp., Bankline Oil Co., D. D. Dunlap Oil Co., The Termo Co. and Hancock Oil Co. each getting one.

The Superior Oil—A. T. Jergins combination finished five wells in the Ranger zone with initials ranging from 350 to 650 bbls. More remarkable than the producaion obtained is the fact that several were drilled in less than ten days elapsed time from spudding to actual completion.

The most northwesterly well in the Long Beach city limits was completed by Richfield Oil Co. when Westend Community No. 1 was brought in pumping 150 bbls. of 14.5 gravity clean oil. Located 140 ft. north of Anaheim Blvd. and 108 ft. west of Hayes St., the Ranger zone was struck at 3195 ft. and pentrated to 3470 ft. A few blocks west, Bankline Oil Co. is drilling Dominguez Harbor Comm. No. 1 below 2850 ft.

Hogan Petroleum Co., failing to find the Terminal zones productive, plugged Graham No. 1 to 3080 ft. and completed it in the upper sand for a flow of 175 bbls. Across 7th St. to the north and west, Richfield seems assured of a good well in Proctor and Gamble No. 4 which has been whipstocked under the soap factory from its surface location on the Breslin property east of the plant.

In the Wilmington area, Royalty Service Co. completed Nelson No. A-6 at "E" and Flint Streets in the deep zone for Sun Ray Co. The well was bottomed at 5660 ft. and with 105 ft. open came in with an initial flow estimated at 200 bbls. a day of 29 gravity oil. Subsequently the well declined to about 100 bbls. James Michelin, formerly with Royalty Service, but now operating independently, completed his first well in the Opp and Lecouveur sector flowing at a 450 bbl. rate. The hole was bottomed at 3000 ft. Selegna Drilling & Producing Co. brought in well No. 11 at the corner of Anaheim and Eubank flowing 250 bbls. from 3200 ft. Krieger Oil Co. obtained only small production from well No. 2, recently completed at "L" and Broad Streets.

Running 22 Strings In Torrance Hot Spot

Activity continues at a brisk pace in the Torrance "Hot Spot" with new projects started at approximately the same rate as wells are completed. Though some operators near the edges have suspended work pending more favorable developments, a recent count showed 22 strings of tools running, which is not far below the high point. Completions generally are small and though the gravity of the oil is comparatively high, water trouble is common and when encountered, is difficult to overcome. Initial productions probably average much less than 250 bbls. per well and often the decline is rapid.

Long Beach Extension Is Basin Bright Spot

The northwest extension of the old Long Beach field continues to be one of the bright spots in the Los Angeles Basin, the new area being somewhat larger than originally anticipated and production on the whole holding up rather well. Hildon Oil Co., discoverer of the new addition, is also the largest scale operator, having two strings running and a derrick being built for another well. Pool No. 1 has 8⅝-in. casing cemented on bottom at 4000 ft., while No. 2 is drilling below 2880 ft. and No. 3 will be spudded on completion of No. 1. These wells are located on a "pooling" of the Bixby and Pacific Electric leases and are between the first producer, Amebco No. 1, and Richfield's good well, Bixby No. 4. A. S. Johnston Drilling Co. and Richfield Oil Co. have spudded well No. 31

and Bixby No. 5, respectively, east of the railroad tracks.

John Abrams & Associates, Willis No. 1, most southerly well west of the tracks, was completed in the second zone pumping 150 bbls. cutting 42%. Present bottom is 4640 ft. An affiliated concern, Winrock Oil Co., is starting a new well 100 ft. to the south.

The joint venture of A. A. MacDonald and Signal Oil & Gas Co. on the Pacific Electric right of way north of the Los Cerritos school, is now approaching the 4000 ft. mark after overcoming hole-caving and loss of circulation difficulties.

West of the Flood Control Channel, The Caminol Co., Dominguez No. 1-8 topped the Alamitos zone at 4460 ft. and, finding it barren, is deepening for the Brown zone. Kramildon Oil Corp., drilling half a mile south of production, is making hole below 5850 ft.

In the Reservoir Hill sector, Shell Oil Co., Alamitos No. 44, is standing cemented with 8⅝-in. casing set at 4180 ft. D. D. Dunlap Oil Co., well No. 13, located on the General Petroleum Corp., Boyer-Kelly lease at Willow and Walnut, is drilling below 3900 ft.

Reduce Water Cut In Montebello West Side

Possibilities that the new intermediary sand in the Montebello west side may be wet are seen in tests recently made by both St. Helens Pet. Co. and Union Oil Co. St. Helens, Monterey No. 24, bottomed at 5781 ft., has made four cement jobs on the 9-in. casing, set at 5408 ft. and each time when cleaned out four feet below the shoe, the well has flowed gross fluid at the rate of 1500 bbls. a day with a salt water content of 10-20%. The most encouraging factor is that with each recementing the cut appears to drop slightly. Union Oil Co., Howard No. 1, located to the south across Lincoln Ave., on a series of formation tests found the same zone definitely wet and is now deepening below 6000 ft. in search of the Monterey No. 20 horizon. Further tests of the new zone will be made in St. Helens Monterey No. 25 which has 9-in. casing standing cemented on bottom at 5390 ft. Monterey No. 26 is drilling in the hard conglomerate below 4400 ft. and No. 27 is a rig.

Union Oil Co., in addition to the Howard well, is drilling Wilcox No. 1 below 5000 ft. and has a rig up for Howard & Smith No. 1.

Standard Oil Co. has joined the active operators and is rigging up Harvey No. 2 on Lincoln Ave. east of Maple.

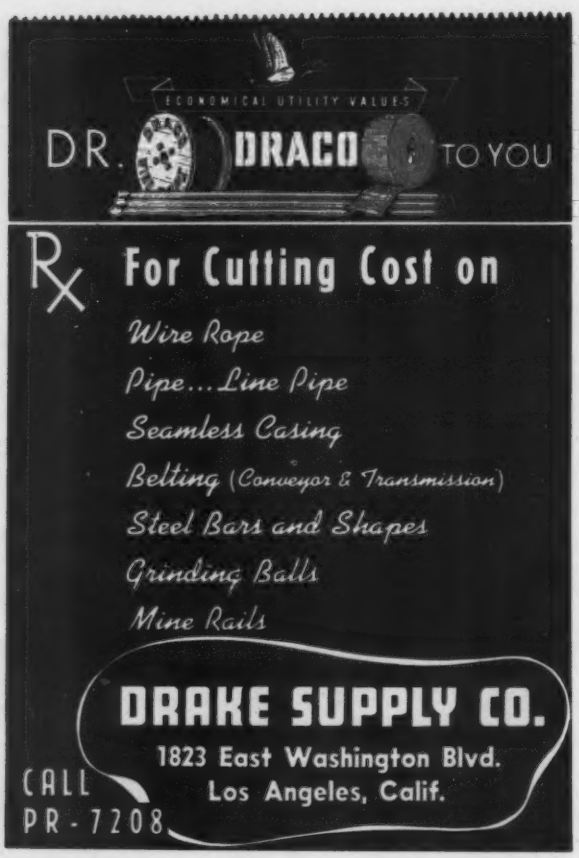
Brookline Oil Co. and McVicar & Rood, the field's only two independent operators, are drilling Drake Comm. No. 1 and Manz No. 1 respectively at 815 ft. and 4459 ft.

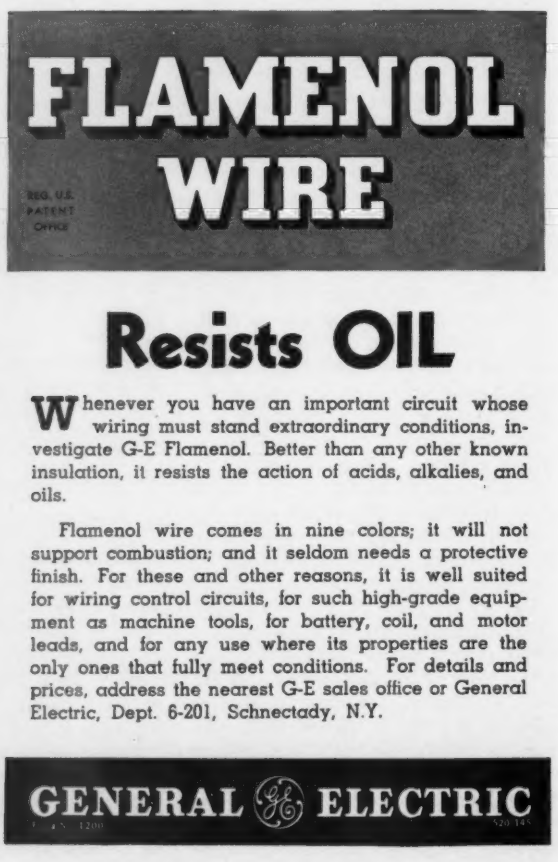
Set Harbor North Line South of 20th Street

Indicating the northern limits of production are somewhere south of 20th St., in the Long Beach area, Pioneer Petrol Co., Irvine No. 1 at 4150 ft. is correlating very low and probably will not be carried much deeper.

Shell Stakes Location For Third Orange Co. Try

Shell Oil Co., believing production may yet be found near Anaheim in Orange county, has started foundations for a third try in the area. Each of the two previous tests encountered good showings but formation tests indicated the sands to be wet and both have been abandoned. The new well is located in the southwest outskirts of the city and is 631 ft. north of Ball Road and 482 ft. west of West St.

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GENERAL ELECTRIC

San Joaquin Valley

Rio Bravo Limits Moving Southeast

From all appearances, the producing limits of Rio Bravo are shortly due to be extended half a mile to the southeast into sec. 1, 29-25 where Superior Oil Co. is preparing to test for production in Ruhl No. 1. A no information policy has been adopted by the company on this well and depths of casing and hole can only be guessed. Roughly, the bottom is 11,500 ft. and the pipe approximately 100 ft. higher. These approximations place the top of the oil sand 160 ft. lower than in the discovery area where both Union Oil Co. and Superior have developed production. Scheduled also for early completion is Superior's Wagner No. 2 located southeast of No. 1. This well also seems to be lower than its producing neighbors, having set casing at 11,300 ft., 60 ft. below the others. The oil sand is said to be of different character than any yet cored in the field.

The next operator to obtain production will probably be Geo. F. Getty, Inc. whose Ramsey No. 1 is now drilling below 11,050 ft., General Petroleum's Wagner No. 1 now being out of the race with a fishing job at 10,200 ft. Wagner No. 2 is drilling at 9000 ft. Beside the already mentioned Ruhl No. 1 and Wagner No. 2, Superior Oil Co. has two other wells drilling and foundations in for another. Anderson No. 1, located in the north half of sec. 35, is drilling below 3100 ft., Wagner No. 3 is approaching 9600 ft. and rig is being built for No. 4 on the same lease.

Kernco, sec. 34 No. 2, continues to be a jinx well for Union Oil Co. Drilled to 11,204 ft., casing cemented on bottom collapsed during the water shut off test, freezing the tubing which has since been recovered to 6200 ft. The collapsed section of pipe is being rolled in an effort to save the hole. Taking a leaf from Superior's book, Union is using heavier equipment including a 178-ft. derrick in rigging up No. 3.

Hogan To Drill In Mountain View

Mountain View, relatively active during 1937 but lately very quiet, is to be the scene of Hogan Petroleum Co.'s next Valley efforts. Preparations are being made by the company to drill Porter-Day No. 11 in sec. 29, 30-29.

Stake Six New Wells In Round Mountain

Activity is becoming more intense in the Round Mountain area with the recent staking of six new wells, with Shell Oil Co. entering on the largest scale. The four projects launched by Shell are Caldwell No. 20, sec. 7, 28-29, and Freeman 17, 18 and 19, all located in sec. 20.

In sec. 8, Crestmont Oil Co. has erected a derrick for a third well on the Staley lease. The new hole will be drilled one location northwest of No. 2 which was completed early in the year pumping 200 bbls. a day, clean oil.

H. A. McDonald is drilling Larkin No. 3 near the center of sec. 12, 28-28.

Shell Abandons In Mount Poso

Shell Oil Co., seeking to extend the limits of production on the Mathews Fee property, in Mount Poso, drilled through the fault in No. 6, located on the Corral Canyon road. Bottomed at 1780 ft., the Vedder zone appeared badly fractured and equipment was moved south and west where No. 6-A is being drilled.

Prospecting a new structure in the southwest quarter of sec. 14, 27-28, W. P. W. Oil Co. got only two dry holes on the Packard lease. Well No. 1 cored the top of the barren Vedder at 1235 ft., while well No. 2, located to the north and east, found the zone at 1150 ft.

Shell Oil Co. has foundation in for a 23rd well on the Security lease.

Several New Projects In Old Kern Front

Several new projects have been recently started in the old Kern Front field. In sec. 11, 28-27, McDonald & Dearin are preparing to drill a new well near the s¼ corner of the section and National Oil Co. has located an offset, Standard No. 5. Kern River Oil Fields of Calif., Ltd., has been held up with a fishing job in No. 1C, sec. 25. The 2007 ft. hole is now cleaned out and is being conditioned to complete. In sec. 15, Standard Oil Co. is preparing to continue with well No. 27 which has been idle at 2230 ft. Spencer Petroleum Co., well No. 1 in sec. 10 has been plugged from 2200 ft. to 2175 ft. and is preparing to test casing set at 2125 ft.

Giuisti 2 Producer in Fruitvale Extension

Pacific Oil & Gas Development Corp., pioneers in the new northern extension of Fruitvale, obtained nice production in the completion of Giuisti No. 2, located near the center of the n½ of the sw¼ of sec. 14, 29-27. Bottomed at 2998 ft. and with 8⅝-in. casing set at 2962 ft., the well was finished with initial production gauging 180 bbls. in 13 hours. Sand trouble, common in this section, has been bothering but the well shows every sign of becoming a satisfactory producer. Present production is 120 bbls. on the pump.

In the same section, Western Gulf Oil completed KCL B-34 from 3040 ft. flowing 350 bbls. a day of 19 gravity clean oil.

Argo Lost Hills Well Now On Production

Seemingly having overcome persistent sand difficulties, Argo Petroleum Corp. now has its north Lost Hills well, Farnsworth No. 1-A on settled production for 30 bbls. a day of 14.5 gravity oil. Located in sec. 11, 26-20, the hole is open 19 ft. below the shoe of the water string cemented at 1270 ft. Seeking the same horizon Randon Petroleum Co. is preparing to drill Theta No. 1 in sec. 3. Standard Oil's United No. 7, sec. 2, is now pumping 15 bbls. daily from 1550 ft. In an attempt to minimize sanding, Texas Co. pulled the liner, wall scraped the hole and gravel packed Theta No. 13, sec. 11. On the pump, the well made 55 bbls. cutting 55%. In the same section, Tide Water Associated Oil Co. deepened Elliot No. 1, an old well, to 1530 ft. and abandoned when no "fourth zone" was found.

Wildcat Resumes In Section 30, 21-14

Northwest of the Jacalitos Hills, Dauphin Development Co. has resumed operations on its wildcat located in sec. 30, 21-14. Drilled originally to 3780 ft., the hole was found to be drifting badly, and now after a short period of idleness is being redrilled from 865 ft. Apparently well located on a small structure, a straight hole here should prove to be a very interesting test.

Exemption from the Federal gasoline tax on motor fuels containing 40 per cent or more of anhyrous ethyl was rejected recently in the House.

Good Well Added By Ohio In Canal

Canal field, Ohio Oil Co.'s contribution to the list of deep new valley pools, is the scene of another good completion. Ohio carried KCL E-5 sec. 14, 30-25, to 8173 ft., 138 ft. below the water string and obtained an initial flow gauged at 100 bbls. per hour with gravity running better than 35.0. After attempting to repair a hole in the 7-in. casing at 7250 ft., Shell Oil Co. is deepening KCL A-2, sec. 13, 30-25, below 8370 ft.

Two other wells are under way, both located in sec. 14. Shell's KCL A-81 is now drilling below 7680 ft. while Ohio's KCL E-6 has not yet reached the 4000-ft. mark. Like Ten Section and Greeley, development here is very orderly with no semblance of competitive drilling.

Gatchell 2 Retains Mystery Well Status

Petroleum Securities Co. has succeeded remarkably well in its "no dope" policy lately adopted on Gatchell No. 2 in sec. 18, 20-16, near the south tip of the old Coalinga field. No secret is made of the upper contacts, the top of the "Big Blue" being placed at 4760 ft. and the top of the Kreyenhagen shale at 5640 ft. Unconfirmed rumors place the Avenal horizon at 6710 ft. and the bottom of the hole at 6850 ft. The bottom is said to be plugged, but this may be a cement bridge over which the 9-in. casing was set. The cementing point is also unknown, ambitious guessers placing it from 6704 ft. to 6755 ft. The company appears to be in no hurry to make a production test, if indeed any is contemplated, and states that operations will not immediately be resumed.

Belridge Test Drilling At 6050 Ft., Sec. 6, 29-22

Now the only exploratory project making hole in the vicinity of Belridge, Ohio Oil Co., Ford No. 1 is down 6050 ft Located in sec. 6, 29-22, the well was started as a validation hole but is now rigged up with heavy equipment. General Petroleum Corp., St. Helens No. 1, sec. 12, 28-20, is engaged in recovering 5500 ft. of drill pipe lost on bottom at 8735 ft. while Shell Oil Co. has abandoned Voight No. 1, sec. 32, 27-20, at 4100 ft.

Get 250-Bbl. Well In Midway-Sunset

The Midway-Sunset field, over 30 years old and now producing 42,000 bbls. a day under curtailment from over 2000 wells, proved itself by no means a back number with the completion of National Oil Co.'s well No. 17 for 250 bbls. Located in sec. 35, 32-23 and finished at 2425 ft., a liner containing 450 ft. of perforations was landed on bottom and the well brought in pumping.

Berry Oil Co., well No. 22, sec. 28, 12-24, is now on the "beam" doing about 35 bbls. of 15 gravity oil cutting 10%.

Shell K.C.L. 1B-76 Abandoned at 7535

Finding only gray water sands in the horizon expected to be productive, Shell Oil Co. has abandoned KCL No. 1B-76 at 7535 ft. Located 950 ft. south and 950 ft. west of the east quarter of sec. 16, 29-26, and only half a mile east of the recently abandoned Standard Oil Co. KCL No. 12-4, no oil showings worthy of note were encountered.

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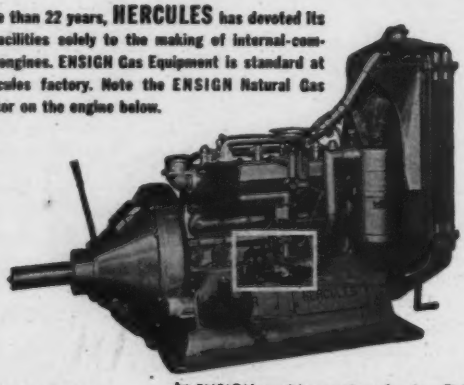

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Paul D. Cornelius

Paul D. Cornelius, manager, pumphead division of the Sullivan Machinery Co., is on the Coast introducing to the California oil industry the new Sullivan pneumatic pumping system.

Mr. Cornelius advises that they now have several hundred of these units in operation in the Texas and Oklahoma fields and that the engineering personnel of the western oil companies are expressing great interest in the economy of operation and general efficiency of the nw Sullivan pumphead operating cycle.

Sullivan Machinery Co. have Pacific Coast offices in San Francisco and Los Angeles.

Standard Lerdo Test Drilling at 7250 Ft.

Standard Oil Co.'s Lerdo test well, KCL No. 18-1 located in sec. 16, 29-26, is now approaching critical depths. Bottom was last reported as 7250 ft. but nothing definite is yet known regarding the project's structural position although some showings were reported below 7000 ft.

Yorba Linda Well Is 200-Bbl. Producer

R. W. Brown & Co., one of the more recent entrants in the Yorba Linda new development, is now one of the most successful. Hurley No. 1, bottomed at 1825 ft. and plugged to 1785, has been completed on the pump from a 65-ft. interval with production gauging close to 200 bbls. per day of 14 gravity oil cutting 6% sand and water.

Playing for the same production found in Shell Core Hole "F", Burmah Oil Co. drilled Sloan No. 1 through the oil sand to 2380 ft. and is now standing with the bottom plugged. In the same vicinity, Hancock Oil Co. is drilling Day No. 1 below 890 ft. Kelmar Oil Co. No. 1, being drilled by Thos. Kelly & Sons, is now at the critical 2100 ft. point and should soon be in the sand. Severns Drilling Co. has staked a location for Sierra No. 1 in block 5 of the Carlton Townsite.

Standard, Fullerton, Drops Semitropic Deep Pay Test

Finally giving up after a long series of tests failed to develop more than a few barrels of oil on gas lift, Standard and Fullerton Oil Co.s have abandoned their Semitropic deep test, Randolph Comm. No. 1 in sec. 14, 27-23. When no important showings were encountered to 9535 ft., the well was plugged to 7630 ft. where formation tests had shown the presence of small quantities of oil and gas. Very little fluid entered the hole at this point, the injected gas blowing the well dry in a few hours.

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Coastal District

Activity Holds Up In Santa Maria Area

Remarkably well does activity hold up in the Santa Maria Valley field. At the peak of activity less than thirty rigs were running, and now with the flush of excitement over, productive limits fairly well defined and a rigid curtailment program in force, the number of live projects fluctuates between 20 and 25. At the present time development is largely within the proven limits and, in most cases, is confined to lease requirements. Total field production is well under the 10,000 bbl. per day allowable and no longer threatens the market seructure. Construction of a small refinery by Five C Refining Co. may, to a limited extent, relieve the pressure, especially should the project be sufficiently successful to encourage other independent refiners to enter the field.

Five new wells have recently been placed on production, none however, with remarkably large yields. Union Oil Co., discoverer and largest operator in the field, brought in two wells, Silva No. 1 in sec. 24, 10-35 and O'Donnell No. 2-1, sec. 20, 10-34. The Silva well, located in the extreme western extension and offsetting LeRoy No. 2, the first completion in the area, was bottomed at 5200 ft. and with 260 ft. of formation open, pumped "in" at the rate of 400 bbls. a day, clean oil. With the pump shut down, the well flows 40 bbls. of 17.5 gravity oil cutting 0.5%. O'Donnell No. 2-1, an eastern offset to the Union Sugar property, was drilled to the top of the Franciscan at 5520 ft. and completed in 425 ft. of Monterey pumping 200 bbls. of 16 gravity oil cutting 22%.

E. H. Moore, Inc. finished Union Sugar H-1 at 5250 ft. pumping 150 bbls. cutting 20%. This well is one location west of Union's O'Donnell 2-1, but was not carried to the schist.

Section 27, always the "Hot Spot", saw the completion of two wells. Bay City Petroleum Co. brought in its first well in the field flowing an estimated 300 bbls. from a total depth of 4370 ft. Palm Holding Co., Bill, Jr. No. 1, was bottomed at 4250 ft. and completed pumping and flowing over 700 bbls., clean.

Drilling wells in sec. 27 include Hanoli Oil Co., Holser No. 1, standing cemented at 4455 ft. after coring the Monterey at 4440 ft.; F. E. Jones, Wisconsin No. 2, making hole below 2100 ft.; Ohio Oil Co., Morrison No. 1, at 3365 ft.; Geo. F. Getty, Vicente No. 4, below 2300 ft., and Sunshine Oil Co., Wallace No. 3, at 4575 ft. beside several wells in preliminary stages.

Recently announced new projects are E. H. Moore, Inc., Union Sugar No. F-1 in sec. 19, 10-34; Union Oil Co., Mallory No. 1, sec. 27, and Nicolai No. 1, sec. 28; I. J. Banducci, G.&B. No.1, sec. 26; and Sunshine Oil Co., Wallace No. 4, sec. 27.

Bulk petroleum shipments from Los Angeles harbor during the week ended March 5 totaled 1,162,420 bbls., a slight decrease under the total for the previous week.

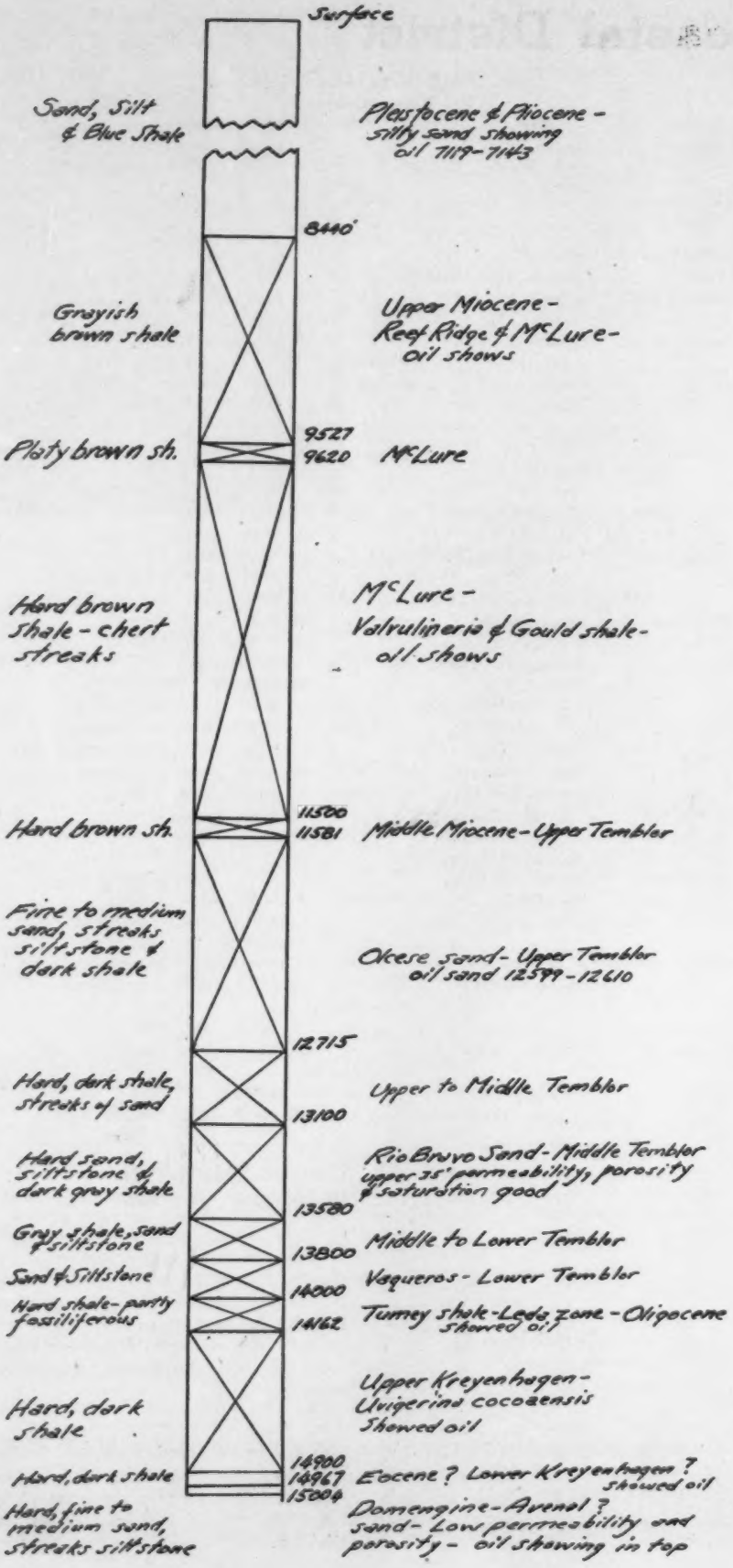
SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Coalinga	Conlon, J. M.	1	25, 19-14	100	Idle
	Petroleum Sec., Getchell	2	18, 20-16	6860	Standing cmtd
	Shell Oil Co.	36-1	36, 19-14		Rig
	Conlon	1	30, 19-15	3160	Abandoned
	Sec. One	1	35, 20-14	1365	Testing
E. Coalinga	Pure Oil Co., SPL	1	31, 18-17	10861	Fishing
Clovis	Central Valley Oil Co.	1	1, 12-20	588	Drilling
Jacalitos Hills	Jacalitos Pet. Co.	1	14, 21-15	5745	Idle
	Dauphin Dev., Boone	1	30, 21-14	3780	Redrilling
Panoche Hills	Panoche Hills Oil Co.	1	12, 14-11	635	Fishing
	Kern County				
Arvin	General Pet. Co., Pauley	1	22, 31-29	500	Idle
	Petrex, Inc.	1	32, 31-30	3635	Drilling
	Union Oil Co., Berry	1	15, 31-29	6735	Drilling
Belridge	General Pet., St. Helens	1	12, 28-20	8710	Fishing
	Ohio Oil Co., Ford	1	6, 29-22	6075	Drilling
	Shell Oil Co., Voight	1	32, 27-20	4100	Abandoned
Buena Vista	Ohio Oil Co., KCL	A-8	32, 31-26	9800	Drilling
Comanche Point	Hall-Baker Co.	1	35, 32-29	350	Drilling
Devils Den	Amerada Pet. Co., Beer	5	22, 26-19	7760	Drilling
	Gibson Oil Co., Alferitz	3	14, 25-18	250	Drilling
	Little Major Oil Co.	1	36, 25-18	250	Idle
Dominion	Dean, Geo. W.	1	26, 26-28		Rig
Edison	British Cons. Oil Co.	1	11, 30-30	100	Idle
	Johnson, G.W. Brown-Paulette	1	33, 29-30	1027	Idle
	Stevens, Ray	1	22, 30-30		Rig
	Wood, Callahan, Porter	1	20, 30-29	4190	Idle
Grapevine	Richfield Oil Corp.	KCL-1	28, 11-20	1325	Redrilling
	Universal Cons. Oil Co.	1	33, 11-19	4990	Plug-Pumping 60b/d
	Shell Oil Co.	KCL 1B-76	16, 29-26	7535	Abandoned
Lerdo	Standard Oil Co.	KCL 18-1	29, 28-26	7300	Drilling
McFarland	Tidewater Assoc. O. Co., Pond	1	17, 26-25		Location
Poso Creek	Reynolds Oil Co.	1	30, 27-27	2855	Testing
	Harkness & Laws, Hunt	1	28, 27-27		Foundation
Richgrove	Dilamar Oil Corp.	1	15, 25-27	2956	Cleaning out
San Emigdio	Shell Oil Co.	KCL 4-26	26, 11-22	8410	Drilling
Temblor Hills	Chico Martinez-Exeter	1	1, 29-20	1066	Cleaning out
	Holly	1	1, 29-20	86	Drilling
Wasco	Continental Oil Co.	KCL A-2	8, 27-24	15004	Flowing 700b/d
	Standard Oil Co., Randolph	2	14, 27-23	9537	Abandoned
	Kings County				
Pyramid Hills	Pyramid Prod. Co., Retherford	1	27, 24-18	3090	Idle
Kettleman	Temblor Oil Co., Bunting	1	25, 23-18	9138	Plug 7815—Idle
	Tulare County				
Ducor	Crusaders Oil Co.	1	1, 24-27	57	Idle
Tipton	Magnet Oil Co., Glaze	1	15, 22-26	3282	Testing

Conoco Spuds Test In Hopper Canyon

One of the most important Ventura county tests in recent years, Continental Oil Co., Elkins No. 1, was spudded early this month and is now drilling below 1300 ft. Located on an anticline in sec. 23, 4-19, the well is said to have possibilities in both the Temblor and Sespe horizons.

Courses in oil production engineering and practical oil geology, both to be given in Los Angeles, are announced by the University of California Extension Division.


Surface
Sand, Silt & Blue Shale
Pleistocene & Pliocene - silty sand showing oil 7119-7143
8440'
Grayish brown shale
Upper Miocene - Reef Ridge & McLure - oil shows
9527
Platy brown sh.
9620
McLure
Hard brown shale - chert streaks
McLure - Valvulineria & Gould shale - oil shows
11500
Hard brown sh.
11581
Middle Miocene - Upper Tembler
Fine to medium sand, streaks siltstone & dark shale
Oicese sand - Upper Tembler oil sand 12599-12610
12715
Hard, dark shale, streaks of sand
Upper to Middle Tembler
13100
Hard sand, siltstone & dark gray shale
Rio Bravo Sand - Middle Tembler upper 35' permeability, porosity & saturation good
13580
Gray shale, sand & siltstone
13800
Middle to Lower Tembler
Sand & Siltstone
Vaqueros - Lower Tembler
14000
Hard shale - partly fossiliferous
14162
Turney shale - Leda zone - Oligocene showed oil
Upper Kreyenhagen - Uvigerina cocoaensis showed oil
Hard, dark shale
14900
Hard, dark shale
14967
Eocene? Lower Kreyenhagen? showed oil
15004
Hard, fine to medium sand, streaks siltstone
Domengine - Avenal? sand - Low permeability and porosity - oil showing in top

Los Olivos District Resuming Activity

The general vicinity of Los Olivos, Santa Barbara county, is scheduled soon to return to the petroleum industry limelight with the recent resumption of operations by United Western Oil Co. and the announcements of two new wells for the area.

United Western Oil is now coring hard, dark shale in Bradley No. 1, sec. 15, 7-30, below 3000 ft. This well is being drilled with excellent equipment and should be capable of making an adequate test.

Continental Oil Co., recent winner of deep hole and deep production honors, holds large leases in this region and expects to start drilling operations within two months.

Farther to the west, Solvang capital, under the name of Jonata Petroleum Co., is spudding in a test well in sec. 16, 6-31. Light equipment is being used, indicating the operators believe production may be obtairned from relatively shallow depths.

Work Increasing In Sespe District

With the coming of spring and fair weather, operations in Ventura's Sespe district are picking up rapidly. Merchants Petroleum Co. has spudded Cochran No. 8 and is now drilling in the tar sand at 115 ft. and Speik Oil Co., No. 1 is standing full of oil awaiting final road repairs to install pumping equipment. Near Fillmore, Claran Oil Co. is rigging up cable tools on Hardison No. 1 in sec. 22, 4-20. Many of the operators having old wells in the area are planning extensive reconditioning programs.

Valoco Haslam 1 In Miocene at 1100

Located in sec. 28, 10-33 in the Garey area of the Santa Maria valley, Valoco Oil Co., Haslam No. 1 topped the Miocene at 1100 ft. and the Franciscan at 1600 ft. The well is standing idle at 1650 ft., showings being reported as marginal.

Crude output and gasoline stocks continued to rise in the week ended March 12, the latter rising to the highest level ever recorded. Crude increased 42,400 bbls. daily to 3,382,100 bbls.

At left: Generalized log of Continental's record depth producing oil well near Wasco.

Troubles Hold Up Two Gaviota Wells

Hard luck struck the two companies operating on the Hollister Ranch a serious blow. For several months Wilshire Oil Co., now drilling its first well in the area, has been furnished with boiler fuel by Gaviota Oil So.'s No. 1 well which was completed as a 10,000,000 ft. gasser last fall. Down almost to the gas horizon encountered in the completed well at 3185 ft., Wilshire twisted off the drill pipe at very nearly the same time that the gas flow turned to salt water, resulting in the rather ticklish situation of having no immediate fuel supply for the one company and no fuel to sell for the other. Having made other arrangements for fuel, Wilshire has now recovered the fish and is preparing to deepen.

Orcutt Wildcat Progress Slow

Silva No. 1, Orcutt wildcat of Bankline Oil Co., got off to a rather bad start in the comparatively hard formations found close to the surface in this area. It was necessary to plug bottom from 600 ft. and redrill to get a straight hole. The well is located in sec. 7,9-33.

Two miles east of the Bankline venture, Southern California Drilling Co. is again attempting to obtain production from Houk No. 1 in sec. 9. Drilled to 5002 ft. last year, many heavy oil showings were noted in the brown shale but no real production obtained. Now plugged to 4250 ft., the 7-in. casing has been perforated below 3950 ft. and a production test is being made.

Moyle Gato Ridge Is 500-Bbl. Producer

Completion of Moyle Petroleum Co. No. 1, sec. 4, 8-32, has started a small flurry of activity in the Gato Ridge field. Bottomed at 3795 ft., the well with 630 ft. open to the shoe of the water string, pumps intermittantly at a rate estimated to be in excess of 500 bbls. daily. In sec. 9, to the south, Petrol Corporation has started work on Tognazzini No. 21-A and O. C. Field Gasoline Corp is preparing to drill Continental No. 3.

A lessee of a service station owned by a producer of oil and gasoline, who purchases his supplies, fixes his sale prices, hires and discharges his own help, and pays all the expenses of operation is not an employee of the company within the meaning of the Social Security Act, and hence is exempt from its taxes.

NORTHERN COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Glenn	Ohio Oil Co., Willard	2	18, 20-2		Rigging up
Humboldt	The Texas Co., Eureka	2	22, 3-1	7708	Plug 6473-Shut in
Monterey	Anderson, A. A., Hillman	1	15, 24-14	4005	Idle
	Elba Oil Co.	1	6, 13-2	4009	Idle
San Mateo	Wilshire Oil Co., Cowell	1	20, 6-5	8007	Plugging & Testing
Solano	Amerada Pet. Co., Maywood	1	36, 4-2	4345	Gas Well
	Richfield Oil Co., Petrero	1	10, 4-1	625	Drilling
	Standard Oil Co., Anderson	1	1, 3-2	1560	Drilling
Sutter	Buttes Oil Fields, Ltd.	3	2, 15-1	6954	Shut in

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Probably its greatest contribution occurred when surface equipment suddenly broke down, as all equipment does occasionally, — with thousands of feet of pipe in the hole. Whenever this happened the "Poor Boy's" Swivel was quickly connected into the top of the drill string, and allowed full circulation and rotation to be maintained while major repairs were made.

If you haven't already seen the Chiksan Circulating Head ask to see one at your nearest supply store. You'll find it the handiest tool in years — a definite contribution to drilling efficiency and a positive safeguard against stuck pipe when equipment break-downs occur!

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COASTAL COUNTIES WILDCATS

Santa Barbara County

Area	Well	No.	Section	Depth	Status
Carpinteria	Carpinteria Oil Co.	1	32, 4-5	2175	Drilling
Cat Canyon	Standard Oil Co., Los Flores	1	27, 9-33	5530	Redrilling
Garey	Valoco Oil Co., Haslam	1	28, 10-33	1655	Idle
Gaviota	Gaviota Oil Co., Hollister	1	35, 5-33	3205	Shut in
	Wilshire Oil Co., Hollister	1	35, 5-33	3080	Cleaning out
Gato Ridge	Moyle Pet. Co.	1	4, 8-32	3795	Pumping
	Field, O. C., Continental	3	9, 8-32		Rig
	Petrol Corp., Tognazzini	1	9, 8-32	1065	Drilling
Los Olivos	United Western, Bradley	1	15, 7-30	3600	Drilling
Orcutt	Bankline Oil Co., Silva	1	7, 9-33	1300	Drilling
	Warren Deuell, Garrett	1	12, 9-34		Foundation
Refugio	Tweedy, A. E., Penn.	1	34, 5-31	1700	Idle
Summerland	Gauthier Oil Co.	17–1	22, 4-26	1400	Idle

San Luis Obispo County

Edna	Loma Grande Oil Co., Lewis	1	28, 31-13		Rigging up
Elkhorn	Calif. Prod. Co.	1	6, 10-24	1550	Idle
	Western Plains Oil Corp.	1	7, 31-21	4010	Idle
Paso Robles	Ajax Land & Dev. Co., Moss	1	27, 26-13	475	Idle
	Vanguard	1	14, 27-14	4360	Idle

Ventura County

Camarillo	So. Calif. Drlg. Co., Daly	2	26, 2-21	3090	Idle
	The Edwards Co., Edwards	1	19, 2-21	6111	Abandoned
Oxnard	Oxnard Oil Co., Vanoni	1	10, 1-22	6302	Plug 6200—Idle
	Walter G. Rowe Johnson	1	15, 1-22	4135	Fish drill pipe
Ojai	High Mesa Oil Co.	1	16, 4-22	1375	Drilling
Red Mountain	Arnett, Frank E.	3	15, 4-21	1167	Idle
Sespe	Commander Oil Co.,Temescal	7-F	13, 4-18	215	Idle
	Condor	1	6, 4:19	2195	Idle
	Continental Oil Co., Elkins	1	23, 4-19	1300	Drilling
	Garmack Oil Co.	1	28, 5-19	565	Idle
	Crosby	1	14, 4-19		Grade
	La Salle & Van Dissen	1	15, 5-19		Grade
	Merchants Pet., Cochran	8	1, 4-20	115	Drilling
	Speik Oil Co.	1	33, 5-19	3440	Rigging pump
	Terry, Geo., et al	1	23, 5-20	1340	Idle
	Williamson Oil Co.	1	1, 4-20	540	Idle
Simi	Trucano, Germanina	1	5, 2-17	1007	Fishing
South Mt.	The Texas Co., Richardson	5	13, 2-21	3890	Drilling
	Clipper Oil Co., Scheiferle	1	17, 3-20		Rig material
Tar Creek	Section 20 Oil Co.	1	20, 5-19	1580	Idle
Timber Canyon	Stallings, Senter, Ahlberg	1	24, 4-21	675	Idle

Good Formation in South Mountain Test

Texas Co., Yale Richardson No. 1, deep test of the South Mountain field, is now down more than 3850 ft. and is reported as having encountered very favorable formations.

East of the field in sec. 17, 3-20, Clipper Oil Co. has foundations in for a well on the Schieferle property.

Jinx Well Abandoned By Texaco, Sec. 19, 2-21

Edwards No. 1, Texaco's jinx well in sec. 19, 2-21 near Camarillo, has at last been given up as a lost cause. Drilled to 6111 ft., the well was plugged to 5915 ft. to test oil showings, when, one after another, three fish were lost in the hole, and the well abandoned.

Loma Grande Rigs Luis 1, Sec. 28, 31-13

Loma Grande Oil Co., operating on a split acreage basis with Continental Oil Co., is rigging up its first well, Luis No. 1, in the Edna district of San Luis Obispo county. Location is in sec. 28,31-13.

Lane-Wells Describes Magnetic Survey Units

Lane-Wells Co. has just issued two informative booklets describing the construction and operation of their small and standard photo-record magnetic single-shot survey instrument. The booklets are profusely illustrated and cover the design, use and care of these instruments as adequately as the reader could wish.

Refining Payrolls At High Record

Oil refining payrolls in 1937 established a new high record of over $150,000,000, exceeding previous record established in 1929 by nearly $20,000,000. Part of the increase was due to greater number of workers employed, but chief factor was higher rate of pay, which stood at 97.2 cents per hour, the highest rate paid by all manufacturing industries.

Encouragement of alcohol-gasoline blending is the object of two measures submitted to Congress.

Axelson Presents Interesting History

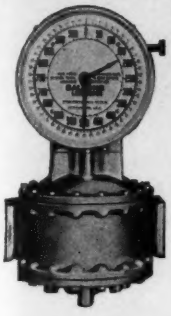
An interesting booklet entitled "Prove and Improve" has just been issued by Axelson Manufacturing Co. The information offered explains the remarkable growth of an internationally recognized manufacturing company from a $1200 machine shop purchased by the Axelson brothers in 1892. Although it was not until the latter part of 1898 that the original Axelson company entered the petroleum business which was to increase its business from a local affair of a few thousand a year to an annual volume exceeding $4,000,000, the ability of C. F. and G. A. Axelson, the founders, marked the company for success from the beginning.

How the machine shop developed from general repair work through production of special printing presses, automobile engines, lawn mowers and threshing machines to its present important position in the petroleum industry, is a story well worth reading, and may be obtained by writing to the Axelson Manufacturing Co., P. O. Box 98, Vernon Station, Los Angeles, Calif.

Offer New Map Of San Joaquin Valley

A new map of the entire San Joaquin Valley has just been placed on the market by Earl M. Price & Co. of Bakersfield. All wildcat wells and their depths are clearly shown and proven fields are outlined and colored, oil fields being tinted green and gas producing areas pink. These maps may be had in two scales, two miles to the inch or three miles to the inch, the latter being especially adapted for use where wall or desk space is limited as the overall size is only 34x37 inches.

Pittsburgh Equitable



The Pittsburgh Equitable Meter Co. has recently announced the Pittsburgh Rotary Meter, an addition to the existing Pittsburgh line of meters for measuring petroleum products. This latest development is said to fill a definite need for a speedy and accurate large capacity meter for bulk plant and tank truck service.

The manufacturer claims there are two factors responsible for the accuracy with which these meters measure. First, they measure through true positive piston displacement. Second, they are precision built to exacting standards.

The Pittsburgh Rotary Meter is built in two sizes, namely, the No. 250 for 2", 2½" and 3" services and having a maximum capacity of 250 gallons per minute, and the No. 500 for 3" and 4" connections with an operating range up to 500 gallons per minute. A complete line of registers and accessories is available. A full description of the Pittsburgh Rotary Meter will be found in the Pittsburgh Equitable Meter Co.'s Bulletin OG-121, which will be sent to those interested upon request to the manufacturer at 400 North Lexington Ave., Pittsburgh, Pa.

LOS ANGELES BASIN WILDCATS

Los Angeles County

Area	Well	No.	Section	Depth	Status
Bellflower	Clayton, Geo. L. Scott	1	32, 3-12	6820	Drilling
Brea	Pressel, Perry, Tull	1	30, 2-9	4560	Idle
Castaic	Royal Land Corp.	1	8, 4-17	555	Drilling
La Mirada	Carmenita Oil Co., Ravera	1	21, 3-11	50	Idle
Lomita	D & B Oil Co.	1	25, 4-14	2100	Drilling—was Sebastian Kramer
Monterey Park	Monte Cristo, Garvey	1	27, 1-2	4240	Prep. to deepen
Mint Canyon	Christien, J. P.	1	7, 4-14		Rig
	Mint Canyon Oil Co.	1	33, 5-14	1860	Idle
Newhall	Barnsdall Oil Co., R.S.F.	3	26, 4-17	3550	Drilling
	National Pet. Corp.	1	27, 4-16	2250	Drilling
Palmdale	Antelope Valley Pet.	1	17, 6-12	50	Idle
Palos Verdes	Gene McLaren	1	27, 4-14	3992	Idle
	Rolling Hills Pet.	1	27, 4-14	4220	Idle
Pico	British Am. O. P. Co.	1	12, 2-12	3990	Prep. to deepen
	A. S. Johnston, Univ. Cons., Pico	1	5, 2-11	5110	Drilling
Pico Canyon	Burt, A. G.	1	36, 4-17	2550	Idle
San Fernando	Tidewater Assoc. Porter		27, 3-16		Location
Towslet Canyon	Towsley Canyon Oil Co.	1	8, 3-16	4100	Cleaning out
W. Long Beach	Pioneer Petrol Corp.	1	26, 4-13	4250	Drilling
Whittier	Fullerton Oil Co., Whittier	5	25, 2-11	2325	Plug 1500
	Langstaff, Geo. W. Iliff	1	8, 2-11		Rigging up
	San Bernardino				
Chino	So. Counties Pet. & Drlg. Co.	1	26, 2-8		Rig
	Orange County				
Kraemer	Congress Oil Co., Kraemer	1	36, 3-9	3017	Idle

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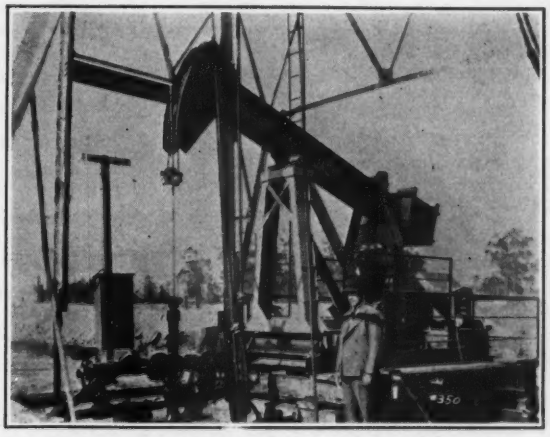

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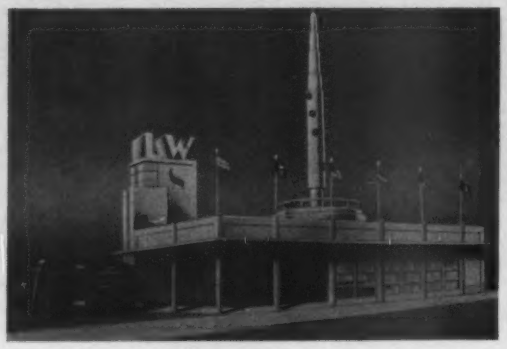
Coffeyville, Kansas, U. S. A.

Beautiful Tulsa Oil Show Building

One of the most colorful and comprehensive exhibits in the history of oil shows is the aim of Lane-Wells Company in their plans for the international Petroleum Exposition at Tulsa.



This exhibit will be on the southwest corner of Block V, just north of the scientific and technical building and two blocks of the cafeteria. It will cover 1440 square feet.

The building will be of a very modern design, and it will have a huge gun-perforator up through the center, surmounted by an American flag. At ten-foot intervals around the building will be flags of some of the other countries served by Lane-Wells Company.

The latest type of gun-perforator truck will be shown, manned by a regular field crew. Truck operations, including controls, weight recorders, depth measurement, et cetera, will be demonstrated without the actual firing of the gun. An assortment of gun sizes, cut-away models, chambers, loads, samples of perforations, and animated movies of the complete story of perforating will be shown.

A complete line of packers and liner hangers will be shown along with the latest developments in Bridging Plugs.

Well surveying and directional drilling will be demonstrated with a complete line of the various types of surveying instruments and cut-away models. There will also be animated moving pictures of oriented surveys, single-shot survey instruments and directional control of drilling wells, including Lane-Wells Knuckle Joints.

This inside exhibit will also include the engineering phases of gun-perforation, design, and application—and other research investigations being conducted in the Lane-Wells engineering laboratories.

Emsco Chief Engineer

Les W. Stahl

Emsco Derrick & Equipment Co. announces the appointment of L. W. "Les" Stahl as chief engineer of the company's Houston Machinery division with headquarters in Houston, Texas.

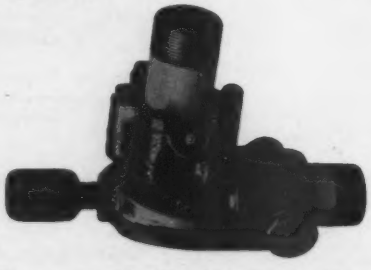
Mr. Stahl first became connected with the Emsco organization early in 1937, and during the past year has been head of a new department, created for the development of rotary drilling equipment, at the home office in Los Angeles. He is a graduate of the University of California School of Mechanical Engineering, and is well known throughout the oil industry, having been connected with a number of major manufacturing organizations closely affiliated with the industry.

New MacClatchie Quick Union Swivel

In response to repeated requests by prominent cementing companies and other users in the United States and foreign fields, the MacClatchie Manufacturing Co., Compton, Calif, has brought out a new development of the Quick Union Connection. This new item, known as the Quick Union Swivel, combines all the worthwhile features of the Quick Union and, in addition, has a swivel connection built into the elbow to provide complete and continuous rotation while circulation is maintained through the joint.

By means of the Quick Union a safe connection can be quickly made that is pressure-tight under the most severe operating conditions. In making connections there are no threads to screw up and no danger of cross threading. This speed feature is particularly appreciated in emergencies.

After the connection has been made with the Quick Union, the swivel element allows lead-in pipes, hoses, etc., to rotate freely without loosening joints or threads. Two rows of ball bearings are used in the swivel element to assure easy rotation and enable the swivel to withstand the most severe usage. An Alemite fitting is provided for quick and positive lubrication.



The new MacClatchie Quick Union Swivel is valuable for all cementing and circulating operations, as well as loading racks, and other refinery installations. On cement head manifolds this swivel union provides a shorter hook-up and still retains the advantages of the swivel in the manifold. The complete swivel and union is only 3" longer than the standard Quick Union used heretofore. Short hook-ups are especially desired under today's high cementing and circulating pressures where heavy fittings and large plug valves are used.

The new MacClatchie Quick Union Swivel is available in different sizes and is built to safely withstand high circulating pressures.

Petroleum exports to Japan in 1937 amounted to 16,047,000 bbls., valued at $22,102,000, compared with 10,381,000 bbls., valued at $14,194,000 in 1936, said the U. S. Bureau of Foreign and Domestic Commerce on March 14. Lubricating grease exports to Japan increased from 6,388,000 pounds in 1936 to 8,921,000 pounds in 1937. Exports of other products also increased.

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CALIFORNIA OIL WORLD NEWS SERVICE

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New Security Line

After a long period of development work, the Security Engineering Co., Inc., Whittier, California, has perfected a revolutionary new line of oil field products for use underground in place of steel equipment, which can be quickly drilled up when occasion demands. These new products, known as Security Drillable Products, are made of "Securaloy" — a tough, strong metal alloy which machines, perforates and threads the same as steel. The mechanical properties of "Securaloy" compare favorably with, and in some cases exceed, those of steel, yet, this new material drills up smoothly and quickly. Having a specific gravity only slightly greater than shale, it readily circulates out of the hole with the drilling fluid.

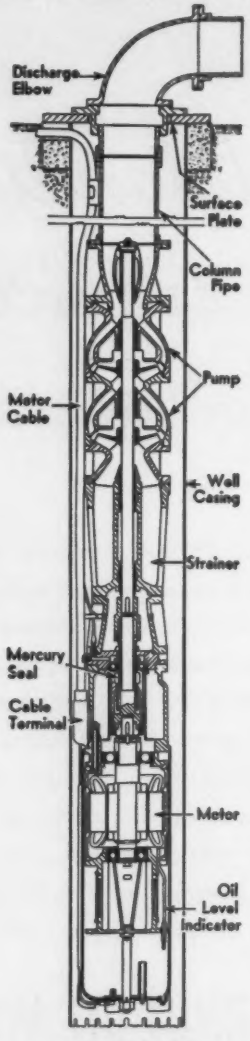
The Security Products create entirely new procedures, new features, and new efficiencies in oil field production and testing methods. When set in producing zones they provide for the future reconditioning or deeped development of wells, and eliminate the hazards of steel articles which may become lost, wedged or frozen in the hole. In addition to conventional liner installations, these drillable products permit new, more efficient production methods, and aid in the solution of other oil field problems by making possible precedures which heretofore have been impractical with steel articles.

Besides drillable production liners, cementing equipment and production testers, a complete line of Security Drillable Accessories is available. These include: Adapters, Bull Plugs, Collars, Liner Hangers, Packers (all types), Pipe, Pipe Fittings, Pipe Nipples, Reducers, etc.

Although "Securaloy" can be drilled up with conventional types of piloted drilling bits, the Security Engineering Co., Inc., is also manufacturing a line of special drilling bits which are engineered to drill up this new material with maximum speed and efficiency.

Complete information on the users of "Securaloy" in solving modern drilling and production problems can be obtained from Security Engineering Co., Inc., Whittier, California.

B. J. Submersible Pump



After eight years of successful performance under a wide range of operating conditions, the Submersible deepwell turbine pump has been placed on the market by Byron Jackson Co., of Los Angeles.

This radical departure from the accustomed type of deepwell turbine pump has its motor below, and not above, the turbine bowls. The propelling shaft is very short and the unusually long, small-diameter motor operates submerged at all times in the well water. However, the liquid pumped does not come in contact with the electrical parts or motor bearings, as these are enclosed in an oil-filled case with a mercury seal where the shaft passes through at the top. The turbine and the submersible motor form a compact unit that is attached to and supported by the discharge pipe. A submarine armored cable and a small copper oil tube, form the only connection (aside from the discharge pipe) between the pumping unit and the surface of the ground. The Submersible operates equally well and without frequent attention, in deep or shallow wells, crooked or straight wells, sumps or natural bodies of water.

This new unit embodies many engineering features that are new to the turbine pump industry. The motor is a squirrel cage induction type and its motor is carried on two ball bearings, one of which is a radical thrust to take both the small weight of the rotary parts, and the hydraulic load. The other ball bearing is of radial type, and its chief function is to center the rotor. A high dielectric oil is circulated through the entire windings at all times and, although the small copper tube affords a means for replenishing the oil supply, motors have operated continuously for several years without adding to or changing the oil supply.

Water is sealed out at the top by mercury in a rotating cup that is attached to the motor shaft. A cylindrical sleeve is placed around the motor shaft, with one end attached to the motor casing and the other end submerged in the mercury. Thus the water and the motor oil are sealed off on their respective sides.

Since the first unit was put in service in February, 1929, there have been some 12,000 H.P. of Submersible units installed. The first pump, set 450 feet in a well and powered with a 50 H.P. motor, still delivers its rated 250 G.P.M. against a 475 foot head.

Complete information (including a large cross-section drawing) can be secured by addressing Byron Jackson Co., Dept. 116, Los Angeles, Calif.

Probability of a special session of the Washington Legislature is reported.

Distribution of $26,730.67 to California's 58 counties and the state highway fund, representing delinquent motor bus and trquck taxes collected by Controller Harry B. Riley, will be made during the first week in April.

Lane-Wells Purchases Two Oil Well Service Companies

Announcement of the purchase of The Geoanalyzer Corp. by the Lane-Wells Co. was made this week by Walter Wells, President of the company. At the same time Mr. Wells announced the purchase also of the M. J. Lewis Oil Well Service Co., of Houston, Tex.

Combining of the Geoanalyzer and Lane-Wells companies enables the Lane-Wells Co. to offer open-hole electric logging under Geoanalyzer patents in addition to its extensive service in gun perforating, well surveying and directional drilling. License arrangements have also been completed by Lane-Wells permitting the use of other electrical logging patents now issued and others pending. So that complete technical oil field services are now available through the Lane-Wells organization.

The Geoanalyzer Corp. was founded by R. D. Elliott and Frederick Hubber. Its operations have been entirely confined in the past to the Pacific Coast territory. Through the efforts of its aggressive engineers, it has developed highly effective methods for studying the physical properties of the formations in an oil well.

The executive personnel includes R. D. Elliott, manager, J. Geraldine, manager Bakersfield division; D. M. Anderson, A. M. Gardner, T. R. Homer and William LeRoy. Geoanalyzer service in electric logging has been built up by oil men who know oil producing problems as well as the technique in electric logging.

Over a period of years, Geoanalyzer has improved existing equipment used in electric logging and developed new equipment and methods. Today, Geoanalyzer is recognied as a leader in the field, and strengthened in personnel and equipment through its merger with the Lane-Wells Co., it is likely that Geoanalyzer engineers will shortly offer new developments.

While Geoanalyzer confines its electric logging service at the present time to California, it is stated that plans are already under way to extend this service to Mid-Continent fields, and ultimately throughout the world.

The M. J. Lewis organization has been connected for years past with the development and perfection of directional drilling appliances in the Mid-Continent and Gulf Coast areas. The purchase continues the established Lane-Wells policy of developing a completely rounded and all-inclusive oil field service in connection with drilling and production.

According to Mr. Wells, purchase included Lewis Knuckle Joint, and all tools, subs, reamers and accessory equipment, as well as field trucks and automobiles. The personnel of seven trained field crews will be continued and augmented as conditions warrant. In speaking of the purchase, Mr. Wells said, "We feel that the acquisition of the Lewis organization, together with the products which they have established in the field, strengthens our oil well survey division materially. We are now in a position to offer not only magnetic single-shot, inclinometer and orienting surveys, but also directional drilling as well."

For the time being, all manufacturing will be carried on in the Lane-Wells Co.'s main plant in Los Angeles. Service and repair plants will be maintained throughout the field to meet conditions as they arise. Lane-Wells Co.'s headquarters in Texas are at 2002 Wayside Drive, Houston; in the Mid-Continent, at 2 Northwest Tenth Street, Oklahoma City.

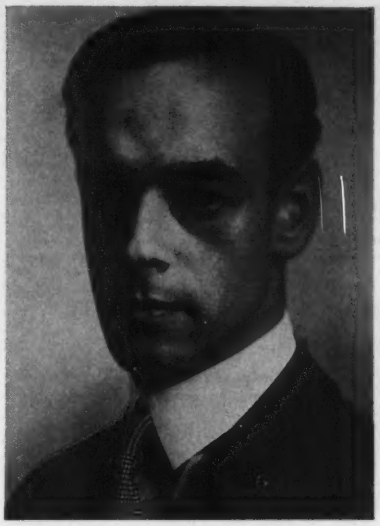
Lane-Wells Quarter Pays 40c on Common

Directors of Lane-Wells Co. have just declared a quarterly dividend of 40 cents a share on the company's common stock, of record April 12. In December, a dividend of 40 cents a share was also paid, and in November another dividend was paid.

A. O. Smith Offers Technical Bulletin

A highly technical treatise which expounds some new and interesting theories on the design of covers and flanges—theories which have been proven by mathematics and tests and which hold promise of great usefulness to many designing engineers, will be found in a non-advertising bulletin which is a valuable contribution to industry by several members of the A. O. Smith Corp. research staff.

New Shell Executive



F. A. C. Guepin

Election of F. A. C. Guepin, newly appointed executive vice-president, to the directorate of Shell Oil Co. and subsidiaries, was announced recently by S. Belither, president.

Mr. Guepin, who became Shell's executive vice-president last November, will hold a similar executive position and serve as a director of Shell Oil Co., Inc., Shell Oil Co. of British Columbia, Ltd., and Gasco Motor Fuel Co., Ltd.

The rapid rise of Shell's newest director to the company's executive vice-presidency and a directorship in ten years is one of the romantic stories of the petroleum industry, Mr. Guepin, only 39 years of age, joined the Shell group in 1928. Promotions followed and Mr. Guepin, who came to San Francisco from New York, acquired an international experience in petroleum production and marketing. He was closely connected with the part played by Shell in international discussions seeking conservation of petroleum resources. Mr. Guepin is married, has one daughter and lives in San Francisco.

"Guepin's recent appointment and election to the directorate of Shell," said President Belither in making the announcement, "is further evidence that any Shell worker may aspire to any post in the company; there is also assurance that the employees are represented in the management by officials who know from their own experience the problems and viewpoint of the men in the ranks."

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GERARD HENNY, Ph.D.
Consulting Geologist
417S. Hill St. Los Angeles
VAndike 7053

MAPS
Large map of Los Angeles Basin oil fields and map showing all California oil fields. Price $15.00 each on paper and $20 each on cloth. Individual state oil and gas maps of Mid-Continent and Rocky Mountain regions. Maps show geological cross sections at base. These maps indicate wells drilling, wells producing and abandoned, with depths.
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Reconditioned or new heat exchangers, stills, fractionators, absorbers, condensers, at cut prices. Plants designed any size for any use. W. F. Pyne, 909 Ardmore Ave., Los Angeles. DRexel 1412. tf

SCOUT REPORTS

NEW MEXICO LEASEHOLDERS: For reliable information on New Mexico developments take my weekly scout report. W. S. Patterson, Santa Fe, N. M.

PIPE

5000 ft. 10¾" O. D. Std. P. E.; 2000 ft. 12¾" O. D. Std. P. E.; 4000 ft. 5" Drill, P. E. Line; 9000 ft. 6" Drill, P. E. Line.
IMPERIAL PIPE & SUPPLY CO., 2901 Santa Fe Ave., Los Angeles. JE. 1104. tf/b

WILDCAT MAP

New colored map of entire San Joaquin Valley, $7.50. Shows all oil and gas fields and prospect wells, with status on March 10, 1938. Earl M. Price & Co., Bakersfield, Calif. 5-20-d

OIL LAND FOR LEASE

Oil land for lease in Coalinga field, Fresno Co. Inquire 328 West Main Street, El Monte, Calif. Phone BUdlong 8-6407. 6-5-d

ACRES TO LEASE

Rosecrans Field—South end. 2 acres to lease near big late developments. Phone Gardena 6541. 4-20-d

Oil Men's Calendar

April

California Natural Gasoline Assn. meets the first Thursday of each month.

17-21—Dallas, Tex., American Chemical Society.

19—Los Angeles, Spring meeting, Pacific Coast, district, A.P.I. Division of Production, Biltmore Hotel.

20-22—Buffalo, N. Y., American Institute Mining and Metallurgical Engineers, Open Hearth Conference.

25-27—Hot Springs, Ark., Western Petroleum Refiners Association annual meeting.

28-29—Pittsburgh, Pa. Spring meeting, Eastern District, A.P.I. Division of Production, William Penn Hotel.

May

6-12—New Orleans, La. American Gas Association. Natural Gas Department.

11-13—Tulsa. Natural Gasoline Association, Hotel Tulsa.

12-14—Tulsa. National Oil Scouts Association of America.

14-21—Tulsa. International Petroleum Exposition.

23-25—A. P. I., Mid - Year Meeting, Wichita, Kansas.

June

6—Houston, Tex. Oil Workers International Union.

20-24—St. Louis, Mo. American Society of Mechanical Engineers.

September

14-16—Santa Barbara, Calif., annual meeting Pacific Coast Gas Association, Biltmore Hotel.

Employment in petroleum refineries in January was only 0.6% below January 1937, according to the U. S. Bureau of Labor Statistics. January employment in all manufacturing industries, however, was down 14%. Payrolls of refinery workers in January were 14.8% above those for 1937, whereas for all manufacturing industries in that month they declined more than employment, being down 19.8% from a year ago. In the crude oil production industry, employment was 4.2 % higher than in January 1937, compared with decreases in almost all other 15 "non-manufacturing" industries. Payrolls were 11% higher than a year ago.